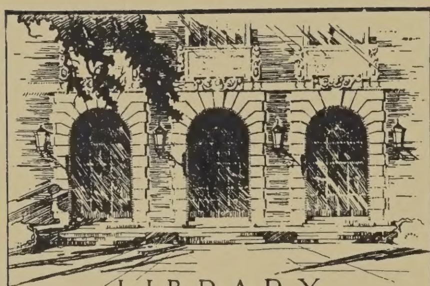

C. H. 404.

LEAGUE OF NATIONS

Health Organisation

PUBLIC HEALTH SERVICES

IN

AUSTRALIA

BY

Dr. J. H. L. CUMPSTON

Director-General of Health, Commonwealth of Australia

AND

Dr. Frank McCALLUM

Publications of the League of Nations

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GENEVA, January 1926.

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AUSTRALIE
Melville I
Darwin
Pine Creek
Broome
Flinders R
NORTHERN
TERRITORY
WESTERN
AUSTRALIA
Ashburton R.
Carnarvon
Gascoyne R.
Murchison R.
Townsville
Flinders R.
Hughenden
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Rockhampton
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Charleville
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P.Augusta
Darling R.
Bourke
NEW SOUTH
WALES
Sydney
CANBERRA
Murray R.
Esperance
Albany
Adelaide
Kangaroo I.
VICTORIA
MELBOURNE
TASMANIA
Hobart

COMMONWEALTH OF AUSTRALIA.

Statistical Summary, 1924.

State or Territory.	Area : Square Miles.	Estimated Mean Population	Crude Birth Rate.	Infantile Mortality Rate.	Crude Death Rate.
New South Wales	309,432	2,228,337	24.11	58.93	9.35
Victoria	87,884	1,641,852	22.01	61.32	10.05
Queensland	670,500	825,151	23.87	51.30	8.88
South Australia	380,070	529,691	21.88	51.33	9.19
Western Australia	975,920	359,521	23.09	49.87	9.08
Tasmania	26,215	214,687	25.07	54.99	9.89
Northern Territory	523,620	3,603	15.82	35.09	12.21
Federal Capital Territory	940	3,848	10.65	48.78	3.90
Total Commonwealth	2,974,581	5,806,690	23.24	57.08	9.47

Note. — Crude birth and death rates : per 1,000 of mean population. Infantile mortality rate : the number of deaths under one year per 1,000 births registered.

S. d. N. 1650 (A.) + 1550 (F.) 1/26. — Imp. Réunies, Chambéry.

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PREFACE

Health legislation and administration constitute one of many factors which go to form the public life of a nation. Like political institutions, health institutions do not arise out of an organic unity and cannot develop on a definite plan. The changes and innovations introduced in the course of years have, for the most part, been made haphazard. The problems have arisen from the vicissitudes of life itself. In short, the needs of the moment have determined the intervention of the legislator and of the administration. The health problem assumes very different aspects at different times and in different places.

The technical resources at the disposal of the various countries and the psychological factors involved have varied in every way and this has given a distinct character to every health organisation. Consequently, it is a matter of great difficulty, even for health specialists, to form an accurate opinion on foreign health organisations ; and yet the great complexity and ever-increasing number of international problems with which we have to deal makes it essential to gain at once some knowledge of these different institutions. Failing this knowledge, not only does co-operation become difficult but the opinion that may be formed regarding the condition of public health in a given country is extremely liable to error.

Furthermore, information on disease obtainable from several different countries is very difficult to compare, as it comes from such different sources.

An indispensable preliminary to any useful study of the problem is a process of standardisation requiring the most thorough knowledge of the international health administrations.

As the work of the Health Organisation of the League of Nations is strictly international, the primary aim of this body should be to remedy as far as possible the difficulties arising from the diversity of the sources of information. The Health Organisation has accordingly decided to publish a series of monographs describing the organisation and working of the health administrations of the different countries. For the writing of these reports it has enlisted the services of experts occupying important positions in the various health administrations.

The original proposal was to make all these monographs conform to a fixed pattern. The Health Section of the Secretariat of the League of Nations accordingly sent a note to the authors of these monographs framed with a view to obtaining reports which could be directly compared ; but the majority of the authors preferred to present their work in a less stereotyped form.

The series of enquiries which we have undertaken to publish deals with health administration from the general standpoint only. We propose subsequently to publish investigations on certain special points in the field of public health which will give additional and more detailed information on these points.

In publishing these general enquiries, we have been greatly helped by the generous financial grants provided by the International Health Board of the Rockefeller Foundation.

Geneva, January 1926.

Health Section of the Secretariat
of the League of Nations.

PUBLIC HEALTH SERVICES IN AUSTRALIA.

CHAPTER I. PUBLIC HEALTH ORGANISATION.

Introductory.

The Commonwealth of Australia is a federation of six States — New South Wales, Victoria, Queensland, South Australia, Western Australia and Tasmania. In addition, two Territories are included in the Commonwealth, the Northern Territory and the Federal Capital Territory. Papua and the Mandated Territory of New Guinea (formerly German New Guinea) are administered by the Commonwealth but are not included within it.

Under the Federation of the States in 1901, a Commonwealth Legislature was established to deal with such matters as were delegated by the Constitution, whilst the States retained control of such governmental functions as were of domestic concern. Under this system, therefore, there are in existence separate health authorities for the Commonwealth and for each State. Broadly, it may be stated that the constitutional powers of the Commonwealth in regard to the public health relate to quarantine and certain functions under the Navigation Act, but for administrative reasons there has developed a considerable extension of health duties performed by the Commonwealth.

The administration of domestic sanitation and hygiene generally is a function of each State, which delegates (whilst retaining certain supervisory powers) matters of local sanitation to the local government authorities proclaimed under the Local Government Act of each State. Whilst the allocation of health functions as between the Commonwealth, the State and the local authority is more or less sharply defined, in practice the administration covers a wide range of governmental authorities. It is convenient to discuss first the functions and administration of the actual health services, the Commonwealth, the State and the local authorities. Each health function can then be considered in detail in order to indicate the authority or authorities concerned. In this way, it is possible to indicate the relationships of the actual health authorities to other Government departments, both central and local, that may be concerned in the administration of functions relating to the public health, or of services accessory or ancillary to actual health services.

Commonwealth Health Administration.

The Federal health authority is the Commonwealth Department of Health, which was formed in 1921 by the extension and development of the Commonwealth Quarantine Service. The department is controlled by the Commonwealth Minister of Health, the chief executive officer being the Director-General of Health, who is permanent head of the department.

Functions. — The functions of the Commonwealth Department of Health as specified at the time of the creation of the department are as follows (extract from *Commonwealth of Australia Gazette*, No. 20, dated March 3rd, 1921) :

> " The administration of the Quarantine Act.
>
> " The investigation of causes of disease and death ; the establishment and control of laboratories for this purpose. The control of the Commonwealth Serum Laboratories and the commercial distribution of the products manufactured in those laboratories.
>
> " The methods of prevention of disease.
>
> " The collection of sanitary data and the investigation of all factors affecting health in industries.
>
> " The education of the public in matters of public health.
>
> " The administration of any subsidy made by the Commonwealth with the object of assisting any effort made by any State Government or public authority directed towards the eradication, prevention or control of any disease.
>
> " The conducting of campaigns of prevention of disease in which more than one State is interested.
>
> " The administrative control of the Australian Institute of Tropical Medicine.
>
> " The administrative control of infectious disease amongst discharged members of the Australian Imperial Force.
>
> " Generally, to inspire and co-ordinate public health measures.
>
> " Any other functions which may be assigned to it. "

These functions might be detailed in a comprehensive but concise way as follows :

1. *International Relationships.*

(a) *International Sanitary Convention.*

The Commonwealth of Australia is a signatory to the International Sanitary Convention under which mutual arrangements for the prevention of the spread of disease from one country to another are formulated. The Commonwealth Department of Health represents the Commonwealth in this connection and is responsible for carrying out the terms of the Convention in respect to any disease occurring in Australia which, under the terms of the Convention, requires to be notified to the International Office of Public Hygiene in Paris and to all countries concerned. Not only are all

developments in connection with the disease itself regularly notified to the International Office of Public Hygiene but all steps taken in combating the disease and in preventing its spread. This involves the collection of necessary information from the various States of the Commonwealth and its compilation and despatch by cable or by weekly statements or otherwise to the International Office of Public Hygiene, and also, where necessary, direct to the countries concerned.

On the other hand, when quarantinable disease breaks out in other countries, the Commonwealth Department of Health is kept informed of all developments and of the precautions taken.

Overseas countries are thus kept fully informed of all developments in connection with the disease and of all steps taken, both as regards shipping and as regards internal communications, for combating the disease. This facilitates trade by reducing the restrictions imposed by other countries on shipping arriving from Australia in connection with their Australian trade.

The Commonwealth Department of Health also has the duty of keeping the Health Section of the Secretariat of the League of Nations fully informed of all details of quarantinable, infectious and notifiable disease in the Australian States. This information is collected and forwarded weekly to the Geneva Office.

In addition, in connection with the occurrence of quarantinable disease in Australia, the consuls of overseas countries resident in Australia are kept fully informed of all developments regarding the disease and of the steps taken to combat it and to prevent its spread.

(b) *Knowledge of Distribution of Disease Overseas.*

The Commonwealth Department of Health has the duty of keeping itself fully informed of all happenings in connection with disease in other countries. The distribution of the various quarantinable and communicable diseases, their relative prevalence in various countries of the world, any alterations in the behaviour of the disease in any country, any occurrence of epidemic disease or the recrudescence of an existing epidemic, the rise or fall in prevalence of endemic disease, etc., are carefully followed. The information is obtained from various sources, partly from the countries concerned under the terms of the International Sanitary Convention, partly from bills of health carried by vessels reaching Australia from overseas, partly from information received from the British Ministry of Health and the Health Section of the League of Nations. All information obtained is at once compiled and made available to those concerned and in particular to all officers concerned with the examination in Australia of vessels from overseas.

The Commonwealth Department of Health thus acts as the Intelligence Bureau for Australia in regard to disease happenings throughout the world and in Australia, receiving intelligence from all quarters and imparting it to all concerned. *Health*, the journal of the Commonwealth Department of Health, is published with the object of making available information regarding public health happenings in Australia and overseas.

2. *Division of Marine Hygiene.*

(a) *Arrival of Ships from Infected Ports.*

All ships arriving from overseas are kept under close supervision from the moment they reach the Australian coast. Ships arriving from overseas cannot enter any but a first port of entry, where they are subjected to an exhaustive medical and sanitary inspection by the quarantine staff. Similar inspection is made at each subsequent port until a period of eighteen days has elapsed since clearing from the last overseas port of call, full pratique being withheld until this period of time has elapsed. Even after full pratique has been given, the master of the vessel is under obligation to report any case of communicable disease occurring on board, and such cases are immediately investigated by a quarantine officer.

In addition, the berthing regulations under the Quarantine Act are enforced at all ports in Australia, and fumigation is carried out either at the terminal port of the voyage or at any previous port if circumstances necessitate it. Thus every ship arriving in Australia from overseas is kept under close supervision during its stay in all Australian ports.

(b) *Treatment of Ships from Infected Ports.*

i. *Infected Ships.* — Should any quarantinable disease break out on board, the vessel is quarantined. The cases and contacts are removed to a quarantine station and the quarantine maintained until freedom from any spread of infection has persisted for the requisite space of time. Necessary action is also taken to prevent any possible entry of infection by means of the cargo of the vessel or of mails.

ii. *Clean Ships.* — Should the vessel be found free of disease on arrival, she is permitted to proceed to further ports without restriction, but undergoes medical and sanitary examination by the quarantine staff at each such port until eighteen days have elapsed since leaving the last overseas port. After eighteen days have elapsed, she is given full pratique, subsequent to which she can enter any port without inspection provided no case of communicable disease occurs on the vessel. In all cases berthing regulations are enforced throughout and fumigation of all holds is carried out at the terminal port called at by the vessel in Australia.

(c) *Correlation with Shore Sanitation.*

The actual legislative powers of the Commonwealth Department of Health for preventive measures cease mainly at the ship's side. Correlation with shore sanitation is not automatic, and it is here that a weak link occurs in the defensive chain.

In regard to inter-State shipping and the movement of persons from one State to another, the Quarantine Act becomes operative when, in the opinion of the Governor-General, Federal action is necessary for preventing spread of infection from one State to another.

(d) *Quarantine Machinery.*

For quarantine purposes, Australia is divided into six divisions, each under a Chief Quarantine Officer (General), who is in local administrative control of quarantine matters within his division. These divisions coincide with State boundaries excepting that the North-Eastern Division extends beyond Queensland State boundaries to embrace the quarantine administration of the North Territory. Under each Chief Quarantine Officer (General) is a staff of permanent quarantine officers and quarantine assistants at the principal ports and of part-time quarantine officers at minor ports. (Animal and Plant Quarantine are dealt with under separate administrative machinery : see below.)

Quarantine Stations. — Quarantine stations have been established at various ports on the Australian coast ; major stations at each of the capital cities and minor stations at Darwin, Thursday Island, Townsville and Albany. A permanent staff is employed at these stations, which are all in readiness for the receipt of patients and contacts at immediate notice. The stations are fully equipped and self-contained with isolation hospital facilities for patients and for cases under observation and accommodation for contacts. They are also provided with laboratories and with laboratory animals and other requirements for rapid diagnosis of disease. Thus, any case or suspected case of quarantinable disease approaching Australia is immediately and effectively isolated without coming in contact with the shore population, and all contacts are also isolated until it is evident that no further infection is present amongst them.

Fumigation. — At each of the principal ports a permanent staff is employed for the fumigation of vessels. This staff is also utilised in inspectorial work in connection with the enforcement of berthing regulations. In ports where no permanent staff is employed by the Commonwealth Department of Health arrangements are made with the Customs Department to provide for necessary fumigations to be carried out and for supervision in connection with berthing regulations.

(e) *Control of Infectious Disease in Mercantile Marine.*

In addition to the measures directed against the introduction of quarantinable disease, the Quarantine Act and Regulations provide for the control of communicable disease in the mercantile marine, including venereal diseases, it being obligatory for the master of any vessel to notify immediately to the quarantine officer any case of the scheduled diseases which occurs on his vessel. Such cases are then investigated by the quarantine officer and appropriate action taken regarding isolation and regarding precautionary measures in relation to contacts.

Medical Inspection under the Immigration Act 1901-1924. — Quarantine officers at the ports of entry into Australia have been gazetted officers under the Immigration

Act. They concern themselves particularly with the examination of passengers with a view to exclude from the Commonwealth :

(*a*) Persons likely, owing to disease or disability, to become a charge upon the Commonwealth ;

(*b*) Idiots or insane persons ;

(*c*) Persons suffering from communicable diseases.

Persons who come under one or other of the classes mentioned above are reported in writing to the Customs boarding officer, who puts into operation the machinery of the Immigration Act.

Navigation Act: Accommodation of Crew and Passengers. — The department has undertaken the responsibility for the matters included in Division 15 of the Navigation Act, which relates to the accommodation of seamen. Quarantine officers have been appointed as medical inspectors under the Navigation Act, and carry out the examination of every vessel registered in Australia or engaged in the coasting trade.

The examinations cover the question of accommodation, superficial and cubic space, ventilation, sanitary, hospital and lavatory accommodation, type of bunks, situation of the accommodation in relation to the load-line of the ship, and the comfort generally of the crew.

In regard to certain matters, such as ventilation, sanitary, hospital and lavatory accommodation, the requirements of the medical inspector are paramount.

A standard instruction has been circulated for the guidance of medical inspectors, and the responsibility has entailed the examination in the various ports of the Commonwealth of approximately 500 vessels of all types — from sailing-vessels to the largest passenger-carriers that enter Australian waters. In addition, the routine reinspection of these vessels has necessitated at least another 500 complete examinations being carried out.

In regard to passenger accommodation, since October 1923, regulations have been enforced in respect to hospital accommodation, sanitary matters, provisions, water and medical and surgical stores. The application of these regulations is entrusted also to the medical inspectors.

Medical Inspection of Seamen. — Quarantine officers have been appointed to act as medical inspectors of seamen under the Navigation Act. Their duties are :

(*a*) Medical inspection of seamen applying for employment or employed on a British ship to determine whether the seamen are in a fit state for duty at sea.

(*b*) Medical examination of seamen where an injury has been received or illness has developed in the service of the ship. The examination is to determine the iability of the owner in regard to the provision of medical attendance and maintenance.

(*c*) Medical examination is required in the case of a seaman left on shore on account of illness or accident incapacitating him for duty. In such case,

the owner is liable under certain conditions not only to payment of medical expenses and maintenance but also to payment of wages at full rates for certain specified periods.

Seamen's Compensation Act. — Chief quarantine officers have been appointed referees under this Act, and to the referee is referred the case of any seaman who has submitted himself for examination and about whose condition there is a disagreement between the employer and the seaman as to the latter's condition or fitness for employment.

3. *Division of Laboratories.*

In addition to the diagnostic aboratories established at quarantine stations at ports for the rapid diagnosis of diseases occurring on vessels arriving from overseas (see " Quarantine Machinery " above), the Commonwealth Department of Health has a division of laboratories which at present consist of the Commonwealth Serum Laboratories at Royal Park, Melbourne, which is the headquarters of the division, and eight branch laboratories situated at strategic points throughout Australia in connection with the carrying-out of diagnostic work, and educative and research work in connection with public health development. The laboratories are situated at :

Rabaul, New Guinea.	Lismore, New South Wales.
Townsville, Queensland.	Bendigo, Victoria.
Rockhampton, Queensland.	Port Pirie, South Australia.
Toowoomba, Queensland.	Kalgoorlie, Western Australia.

The Commonwealth Serum Laboratories at Royal Park, Melbourne, carry out the manufacture of human and veterinary products, vaccines and sera for Australia. Australian types of organisms are used and sufficient sera and vaccines, etc., are produced for the needs of the Commonwealth, practically the whole range of biological products being covered. In addition, all types of media and special diagnostic agents are produced as well as glandular and other extracts for therapeutic use. The products of the laboratories are available to all medical practitioners in Australia.

From the Central Laboratory at Royal Park the technical work of the staffs at the branch laboratories enumerated above is controlled. These branch laboratories were established in order to undertake research into the great public health problems of Australia and in order to provide facilities for the medical practitioners of the district to obtain the benefits of the most up-to-date laboratory diagnostic assistance and to act as educative centres in the public health movement. Co-operation between the general practitioner, with his clinical observations and knowledge of the environment of the disease, on the one hand and the staff of a well-equipped laboratory on the other hand is essential to the efficient investigation of disease and the effective operation of control measures.

The branch laboratories as well as the divisional officers of the Commonwealth Department of Health in each State serve as distributing centres for the biological products of the Commonwealth Serum Laboratories. The branch laboratories

are at present engaged on a general tuberculosis investigation throughout Australia and in the investigation into the efficiency of certain disinfectants. This is in addition to investigation into local public health problems and the routine diagnostic work which takes up a large proportion of the time of the staff. The laboratories from Lismore northwards are associated also with the carrying-out of the hookworm control measures and with research into hookworm problems.

4. *Division of Tropical Hygiene.*

The Director, Division of Tropical Hygiene, is in local administrative control of quarantine in marine hygiene matters in the North-Eastern Division and Northern Territory, also of the branch health laboratories of that division and of the laboratory at Rabaul. These laboratories are engaged in research work in matters associated with tropical medicine, sanitation and hygiene. The Director, Division of Tropical Hygiene, is also in administrative control of the Australian Institute of Tropical Medicine of Townsville, which is the main centre in Australia for research into tropical problems.

The work of hookworm control in Australia is also administered by this division, two field units, each consisting of a medical officer and five well-trained field inspectors, being constantly employed, the Australian Institute of Tropical Medicine and the several health laboratories co-operating in laboratory and research work.

5. *Division of Industrial Hygiene.*

This division was established in 1921. Its objects are :

The collection of reliable data on which to base guidance and advice, investigation of industrial conditions affecting health and the issue of advice to employers and employees for the improving of conditions of work and for the safeguarding of health. Publications have been issued dealing with the scope of industrial hygiene in its various aspects and with health hazards and the provision of safety appliances in industry. Expert advice is available to employers and employees and it is expected that the work of the division will be of great value in guiding the development of industry along hygienic lines and in improving generally the conditions of workers. Two conferences between delegates of the Commonwealth Department of Health and of the State Health and Labour Departments have been held in an endeavour to arrive at a concerted basis of action and a uniform basis for standards and records.

The Director of the Division of Industrial Hygiene is a member of the Advisory Committee on Industrial Hygiene of the International Labour Office, and in this way close touch is kept with all developments in the field of industrial hygiene in other countries.

6. *Division of Sanitary Engineering.*

The Division of Sanitary Engineering of the Commonwealth Department of Health was established in 1923. Investigation and enquiry have been made into numerous

sanitary engineering problems affecting Australia, many of which have been referred to the department by the State Governments.

A publication has been issued on the important question of *The Pollution of Streams and Other Natural Waters in Australia*, and data have been prepared and published on *The Operation of Small Septic Tanks.* Advice is given by the Director, Division of Sanitary Engineering, on the protection of water supplies, drainage and other engineering questions affecting health.

Any student of the Engineering School of the University of Melbourne who desires to specialise in sanitary engineering may take a course in bacteriology, chemical analysis and microscopy at the Commonwealth Serum Laboratories at Royal Park.

7. *Animal and Plant Quarantine.*

The administration of the Quarantine Act and regulations relating to the introduction of animals and plants from overseas is carried out by officers of the State Agricultural and Veterinary Departments, who for this purpose are appointed quarantine officers under the administrative control of the Director-General of the Commonwealth Department of Health. Provision is made for the quarantine of animals for specified periods at animal quarantine stations which are maintained at certain ports and also for necessary action in regard to plants, including fumigation and other means of destroying plant diseases.

Other Commonwealth Functions related to the Public Health.

Northern Territory. — The Territory is under the administration of the Resident Administrator appointed in the Department of Home and Territories. A registrar-general and a health officer are provided for, also the registration of births, deaths and marriages. Quarantine is provided for by a medical officer of the Administration acting as a quarantine officer in direct relationship to the Commonwealth Department of Health.

Federal Capital Medical Services. — The administration of the Federal Capital Territory is vested in a Commission which, in regard to matters of health and medical services, is in constant consultative relationship to the Commonwealth Department of Health.

Territory of Papua and Mandated Territory of New Guinea. — These territories are under separate administrations, which are responsible to the Department of Home and Territories. Local medical services are maintained. There is some measure of co-operation with the Commonwealth Department of Health, instanced by the establishment of a Commonwealth Health Laboratory at Rabaul and the seconding of a senior officer of the Division of Tropical Hygiene to act as Director of Medical Services for the Mandated Territory.

Medical Examinations of Employees of the Commonwealth Public Service. — These services have now been incorporated amongst the functions of the Commonwealth Department of Health, and the work is carried out by officers of the department.

Invalid Pensions. — The administration of the Commonwealth Invalid and Old Age Pensions Acts of 1908-1916 is performed by officers of the Treasury Department. There is some co-operation with the Commonwealth Department of Health in that references are made from time to time on matters of medical importance, and medical officers of the Department of Health have made an epidemiological survey of pensioners suffering from tuberculosis.

Maternity Allowance. — Under the Maternity Allowance Act of 1912 the Federal Government grants a sum of £5 in the case of each confinement resulting in the birth of a viable child, whether such is born alive or dead. The Act is administered by the Treasury Department, and relationship to the Department of Health is only consultative, reference being made from time to time as a matter of courtesy or convenience, not of procedure.

Defence Department Medical Services. — The Medical Services of the Army, Navy and Air Force are not related to the civilian population except in regard to the medical examination of the Citizen Forces. Medical treatment is provided by the medical branch of a separate Department of Repatriation for discharged nurses, sailors and soldiers who are suffering from disabilities caused or aggravated by war service in the Great War of 1914-18.

State Health Administration.

In each State, a Department of Public Health administers the Health Act, together with other relevant legislation. Accessory services administered by other authorities can be considered separately at a later stage. The central health administration in each State may be summarised as follows :

Ministerial :

Minister of Public Health : New South Wales, Western Australia.
Minister of Health : Victoria.
Chief Secretary : South Australia, Tasmania.
Home Secretary : Queensland.

Administrative Body.

A Board is constituted in New South Wales, Victoria and South Australia, the chairman of which is the permanent head of the Department of Public Health. In Queensland, Western Australia and Tasmania, the administration is in the hands of the permanent head of the Department of Public Health alone.

Duties of the Board.

In New South Wales, the central control is exercised by a Board of Health consisting partly of prominent medical practitioners and partly of laymen. In South

Australia, the central controlling body is the Central Board of Health, and in sparsely populated areas that body is the sole administrative authority. In Victoria, the Commission of Public Health enforces the provisions of the Act generally, and in addition (subject to funds being legally available) is vested with powers of enquiry and research into questions of prevention and suppression of disease.

The Health Department in each State.

The health administration in each State is clearly and concisely described in the *Official Year-Book of the Commonwealth*, No. 17, 1924, pp. 515 *sqq.*

New South Wales. — The Department of Public Health is controlled by the Minister of Public Health. The Director-General of Public Health is the chief executive officer and is assisted by various staffs—medical, bacteriological, chemical, veterinary, dairy inspection, meat inspection, sanitary, pure food and clerical. The work of the department extends over the whole of the State and embraces all matters relating to public health and the general medical work of the Government, the Director-General of Public Health holding the position of Chief Medical Officer of the Government as well as being permanent head of the Department.

The Board of Health has certain statutory duties imposed upon it by various Acts of Parliament, and the Director-General is president of the board. These duties consist largely in supervision of the work of local authorities (Municipal and Shire Councils) so far as the work touches upon public health matters connected with the following Acts : Public Health Act 1902, Public Health (Amendment) Acts 1915 and 1921, Dairies Supervision Act 1901, Noxious Trades Act 1902, Cattle-Slaughtering and Diseases Animals and Meat Act 1902, Pure Food Act 1908, Private Hospitals Act 1908, and Venereal Diseases Act 1918. The board further possesses certain powers connected with public health matters under the Local Government Act 1918. The Board of Health is a nominee board, created in 1881 and incorporated in 1894.

The Director-General of Health acts independently of the Board of Health as regards the State hospital and asylums and the various private hospitals throughout the State which receive subsidies from the Government.

Victoria. — In Victoria the Public Health Acts 1915-19-22 are administered by a Commission composed of the Chief Health Officer and six members appointed by the Governor-in-Council. The medical and sanitary staff of the Commission consist of : *(a)* the Chief Health Officer, who is also chairman ; *(b)* six district health officers and three assistant health officers ; *(c)* Chief Sanitary Engineer and Assistant Sanitary Engineer, three building surveyors and four building inspectors ; and *(d)* ten health inspectors. The main function of the commission is to enforce the execution of the Health Acts by the local municipalities, but it has been found advisable to supplement this supervisory function by an active policy of inspection of the sanitary condition of various districts and the sampling of articles of food. The supervision of the sanitary conditions of milk production is under the Dairy Supervision branch of the Department of Agriculture, but distribution is supervised by the commission.

Acts administered by the Department of Public Health are : the Health Acts (in which are now included the Adulteration of Wines Act, the Pure Food Act, the Meat Supervision Act) and the Cemeteries Act, which includes the Cremation Act. The department administers also the Midwives Act, the Goods Act, the Venereal Disease Act, the Infectious Diseases Hospital Act, the Heatherton Sanatorium Act, the Masseurs Act and the Nurses Registration Act.

Queensland. — The Public Health Acts 1900-1922 are administered by the Commissioner of Public Health under the Home Secretary. The executive staff of the department includes a health officer, a medical officer for the tuberculosis bureau, two medical officers for venereal diseases, fourteen food and sanitary inspectors and one staff nurse. There are, in addition, rat squads in Brisbane. Northern offices, in charge of inspectors, are located at Rockhampton, Townsville and Cairns, whilst another inspector is stationed at Toowoomba. A laboratory of microbiology and pathology is maintained by the department and performs a wide range of microbiological work for the assistance of medical practitioners and the department.

One function of the department is to stimulate and advise local sanitary authorities on matters pertaining to the Health Acts and, where necessary, to rectify or compel rectification, at the cost of the local authority, of sanitary evils produced by local inefficiency or apathy.

South Australia. — The Central Board of Health consists of five members, three of whom (including the chairman, who is permanent head of the department) are appointed by the Governor, while one each is elected by the city and surburban local boards and the country local boards. The Health Act 1898-1918 provides that the municipal and district councils are to act as local boards of health for their respective districts. There are 188 of these local boards, under the general control and supervision of the Central Board. A chief inspector and one inspector under the Health and the Food and Drugs Acts periodically visit the local districts and see generally that the boards are carrying out their duties. There is also a Chief Inspector of Foods and Drugs (under the Food and Drugs Act 1908-22), who, in company with an analyst, visits country districts and takes samples of milk, which are analysed on the spot. There are three more inspectors employed in advising and assisting local boards in connection with outbreaks of infectious diseases. In the outlying districts there are sixteen inspectors directly responsible to the board. The Venereal Diseases Act 1920, which provides for the prevention and control of venereal disease, has not yet been proclaimed.

Western Australia. — The legislation in this State comprises the Health Act 1911 with amending Acts of 1912, 1915, 1918 and 1919, partly consolidated as the Health Acts 1911-19. Further amending Acts were passed in 1920 and 1921. The central authority is the Department of Public Health, controlled by a Commissioner. The local health authorities comprise : *(a)* municipal councils ; *(b)* road boards, where the boundaries of a health district are conterminous with those of a road district ;

and *(c)* local boards of health composed of persons appointed by the Governor. These local boards are utilised only where neither municipal councils nor road boards are available. Generally speaking, the Act is administered by the local authorities, but the Commissioner has supervisory powers and also power to compel local authorities to carry out the provisions of the Act. In cases of emergency, the Commissioner may exercise all the powers of a local health authority in any part of the State.

All the usual provisions for public health legislation are contained in the Act and, in addition, provision is made for the registration of midwifery nurses, the medical examination of school-children, the control of public buildings *(i.e.*, theatres, halls, etc.), the control of food and the provision of standards therefor. The amending Acts of 1915-18 deal exclusively with venereal diseases.

Tasmania. — The office of Director of Public Health was established by a special Act of 1920, and the person holding the office of Chief Health Officer under the Public Health Act at the time of passing of the former Act became the Director of Public Health and also permanent head of the department. This officer has very wide powers, and, in the event of the appearance of dangerous infectious disease (smallpox, plague, etc.) in the State, is vested with supreme power, the entire responsibility of dealing with such an outbreak being taken over by him from the local authorities. Local executive is vested in local authorities, who possess all legal requirements for the efficient sanitary regulation of their districts. Controlling and supervisory powers over these bodies are possessed by the Department of Public Health, and many of the powers conferred upon them may be converted into positive duties. One function of the department is to advise local authorities on matters pertaining to the Health Act and, where necessary, to rectify sanitary evils produced by local inefficiency or apathy. The department has four full-time inspectors, who assist and instruct the local sanitary inspectors, but full-time district health officers are not provided for. The number of local authorities under the Public Health Act has been reduced to 49 since the Local Government Act of 1906 came into force. All parts of Tasmania are now furnished with the administrative machinery for local sanitary government.

The Public Health Acts 1917 and 1918 deal with venereal diseases. Regulations under the Health Act 1903, as amended, for checking or preventing the spread of any infectious disease came into force in 1918.

The Places of Public Entertainment Act 1917 is administered by the Director of Public Health under the Minister. This Act provides, *inter alia*, for the licensing and regulation of places of public entertainment, for the appointment of a censor or censors of moving pictures and for the licensing of cinematograph operators. Comprehensive regulations have been framed under the Act. Inspectors under the Public Health Act 1903 are inspectors of places of public entertainment under this Act.

The department also administers the Mental Deficiency Act, which makes special provision for education and control of deficients. The department also exercises control over the Government Mental Hospital.

The Local Authority and Health Administration.

In Australia, the development of local government has been fairly rapid, so that at the present day practically the whole area of four States is under the control of municipal or district councils, while only the more thinly populated parts of New South Wales and South Australia are not yet brought under their jurisdiction. These local authorities are of importance in regard to health administration, since, under the Health Acts of the several States, these authorities become the local units of administration in regard to local sanitation and hygiene. In regard to health matters, the Council may act as a whole or detailed items may be considered by a health committee and then submitted to the authority as a whole. The medical officer of health appointed by the authority acts as the technical officer of the authority together with such inspectorial staff as may be appointed. This medical officer, except in the case of the capital cities, is a local medical practitioner, who is paid a retaining fee by the local authority so to act. His terms of appointment are conditioned under the provision of the Health Acts, by the approval of the Chief Health Officer of the State.

The local authority is constituted by the Local Government or analogous Act of each State. The State for this purpose is divided into areas — cities, municipalities, towns, districts, shires, etc., the definition of such areas being based on specified property valuation, revenue and population data. Qualifications of the councillors nominated for election to the local authority, and of electors, are for the most part the possession by natural-born or naturalised adults of property in the area of a specified annual rental nature. Rating powers are given to the local authority, and rates may be levied in accordance with a prescribed schedule of maximum and minimum rates that are legally permitted. These rates may be ordinary or special, which may include such public health items as sewerage and drainage, water supply, cleansing of streets and garbage collection. In several States as an alternative to cleansing rates, the council may make an annual charge for removal of night-soil [1] or garbage. Provision is made for the passing of various by-laws and ordinances by the local authority. Under the Local Government Act of each State, therefore, the local authority is constituted and functions in regard to health matters in various items of local concern broadly expressed in regard to the sanitary arrangements of the area, removal of night-soil, prevention of nuisances, etc. The local authority in addition becomes the local authority in the terms of other Acts, the Public Health Acts, Abattoirs and Slaughtering Acts, Cemeteries Acts, Dairies Supervision Act (where not incorporated in the State Health Act) and various Acts related to sewerage and drainage and to water supply. In addition, joint local boards may be formed to administer specified health functions, this board usually being constituted of members representing the local authorities concerned together with members nominated by the Central Government.

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[1] "Nigh t-soil": This term is used in Australian sanitary legislation, in accordance with established English precedent, to mean human excreta — fæces and urine.

Relationship of the Local Authority to the State Health Department.

The relationship of the local health authority to the State or central health authority varies to a certain extent in each State. The position in New South Wales and in Victoria may be reviewed in somewhat more detail as indicating the existing relationships.

New South Wales. — New South Wales, founded on a basis of necessary military autocracy in which the good of the community was paramount and the welfare of the individual of little account, has gradually, throughout the century and a-half of its existence, evolved a form of government in which the centralisation of authority still persists to a high degree, with a slow release of power into the hands of local authorities. In the existing form of health administration there is still a greater degree of centralisation than exists in the other Australian States. The following paragraph, from the Health Act 1915, illustrates the relationship :

> " The board *(i.e.*, the State Central Health Authority) may require the council of a municipality or shire or its officers to do any specified acts in relation to any of the matters mentioned in Part I of the schedule which might lawfully be done by such council or officers in virtue of any power (except the power to make ordinances or by-laws) conferred or of any duty imposed by any statute, regulations, ordinances or by-laws, and may in such requirement specify the time within which and the manner in which such acts shall be done.
>
> " If such council or officers fail to carry out any such requirement as aforesaid, the board may do or cause to be done the said acts, and for that purpose shall have the powers of such council or officers ; and thereupon the board may demand the payment to it by the council of any expenses incurred by the board in doing the said acts or causing them to be done. Any regulations, ordinances or by-laws which relate to any of the matters mentioned in Part I of the schedule shall, before being made, be submitted to the board. Such regulations, ordinances or by-laws shall not be made unless the board gives its approval of such of the provisions thereof as relate to the matters aforesaid. "

The " matters mentioned in Part I of the schedule " are :

> " Keeping premises free from offensive or unwholesome matter and the suppression of nuisances arising therefrom ; regulating the storage, sale, conveyance, disposal and delivery of meat, fish, oysters and crustacea ; regulating cattle intended for slaughter and regulating abattoirs and slaughter-houses ; sewerage and drainage ; the removal of night-soil, filth, refuse and garbage, and the destruction of garbage ; the construction and situation of privies, the regulation of the degree of closet

accommodation ; public urinals, closets and lavatories ; the sanitary requirements of public baths, dressing-sheds and dressing-rooms ; the regulation and control of common lodging-houses and seamen's boarding-houses ; the establishment, control, maintenance and regulation of infants' milk depots ; the regulation of the interment of the dead. "

Victoria. — Victoria, dominated in its earliest years by the influence of New South Wales, has undergone development in a different direction. At an early stage in its career certain local communities revolted against the arbitrary exercise of central authority, and there has consequently developed in Victoria a form of government in which the local authorities exercise in practice a considerable degree of self-government. It will be of interest to quote certain sections of the Health Act of the State of Victoria. The specifications of the powers of the central authority (*i.e.*, the Commissioner of Public Health) are as follows :

> " In addition to any other powers and duties of the Commission, the commissioner may exercise all or any of the following duties : *(a)* to promote the prevention, limitation and suppression of infectious and preventable diseases ; *(b)* to report to the Minister upon matters affecting the public health and upon any amendments which it thinks advisable in the law relating thereto and upon matters referred to it by the Minister ; *(c)* to promote or carry out researches and investigations and to make enquiries in relation to matters concerning the public health and the prevention and treatment of disease ; *(d)* to publish reports, information and advice concerning the public health, and in particular concerning the prevention and control of disease and the education of the public in the preservation of health ; *(e)* to advise and assist councils in regard to matters affecting the public health ; *(f)* to prepare regulations under this Act for submission to the Governor-in-Council ; *(g)* to prepare model by-laws for adoption by councils pursuant to this Act. "

In order to meet any urgent contingency, the Commission is invested with special powers :

> " In any emergency or sudden necessity (of the existence of which emergency or necessity the Commission shall be sole and final judge), the Commission may for the purposes of this Act exercise and perform in any part of Victoria all or any of the powers and duties of a council. "

To provide for the decentralisation of the administrative functions of the Commission, provision is made for the appointment of district health officers, whose functions are defined as follows :

> " Every district health officer shall : *(a)* be subject to the directions of the chief health officer ; *(b)* report quarterly and also annually to the chief health officer on the public health and sanitary circumstances of the health area ; *(c)* make to the chief health officer as occasion requires such

suggestions as the district health officer thinks desirable for more effectually promoting the objects of this Act ; *(d)* advise and assist as he deems fit medical officers of health and inspectors of councils having jurisdiction in the health area and any part thereof ; *(e)* exercise such powers and duties to the chief health officer as are assigned to him under this Act by the chief health officer and perform such duties as are required by the Commission or as are prescribed ; *(f)* perform such duties in connection with the medical inspection and the promotion of the health of school-children as are prescribed. "

Notwithstanding that the duties as here prescribed consist largely of supervision of a paternal nature, there are definite powers of compulsory direction. For example, the commissioner may enforce the appointment of a medical officer of health by any council ; the commissioner may make regulations " generally, carrying into effect the purposes of the Act " ; and it has reserve powers of compulsion over any council which fails to discharge any of the duties statutorily prescribed.

While there is in Victoria very extensive local autonomy, there is also comprehensive central direction. This relationship is well illustrated in the following clause :

" Every council : *(a)* may, and when required by the Commission shall, make or adopt by-laws to all or any of the purposes for or with respect to which such council is authorised or required to make by-laws under the Act ; and *(b)* shall when so required by the Commission revoke, rescind, amend or vary or suspend the operation of any by-law.

" All by-laws made or adopted by a council under this Act : *(a)* shall be submitted to the Commission ; *(b)* shall be subject to the approval of the Governor-in-Council ; *(c)* may be revoked by order of the Governor-in-Council. "

Queensland. — A function of the Department of Public Health is to stimulate and advise local sanitary authorities on matters pertaining to the Health Acts and, where necessary, to rectify or compel rectification, at the cost of the local authority, of sanitary evils produced by local inefficiency or apathy.

South Australia. — The municipal and district councils which act as local boards of health are under the general control and supervision of the Central Board, and the Central Board may assume the powers of the local authority, even the taxing power.

Western Australia. — In most of the matters in which local authorities exercise power, the Commissioner of Public Health is given over-riding power. Generally speaking, however, the administration is carried out by the local authorities, whilst the commissioner has reserve supervisory powers, and also power to compel local authorities to carry out the provisions of the Act. In cases of emergency, the commissioner may exercise all the powers of a local health authority in any part of the State.

Tasmania. — The Public Health Act is so framed that there will be as little interference with local administration of affairs as possible. A function of the Health

Department is to advise local authorities on matters pertaining to the public health, and the department has power to rectify sanitary evils produced by local inefficiency or apathy. In the event of the appearance of dangerous infectious disease, *e.g.*, smallpox, the Director of Public Health is vested with supreme power, the entire responsibility of dealing with such an outbreak being taken over by him from the local authorities.

In general, although the position has been seen to vary in the several States, it may be summarised that the local authority is the real health authority, since the cost of domestic health is a charge against the locality or community and the incidence of the tax rests on property or land. Moreover, the health and other functions of local government are closely inter-related ; in a general sense, it may be said that the health functions embrace all the other functions of local government. In regard to the exercise of these health functions, the State Health Department stands over the local authority in that it can :

(a) Require the local authority to superintend, enforce and execute the regulations ;

(b) In case of default by the local authority, perform duties or exercise powers at the expense of the local authority ; and

(c) In case of emergency (of which the chief health officer is sole judge) exercise and undertake any or all of the powers and duties of the local authority at the expense of the local authority.

The Minister and the Governor-in-Council stand over the State Health Department in that orders must be confirmed by the Minister and regulations approved by the Governor-in-Council.

State Health Functions as exercised by the State Health Department or by the Local Authority.

Grouping the public health functions according to the legislation in force in each State, it is possible to obtain a bird's-eye view of the health functions exercised in each State :

1. *Public Health Act.*

The principal Act administered by the State Health Department is the Public Health Act, which deals with nuisances, refuse, night-soil, offensive water-courses, sewers and drains, pollution of water, offensive trades, dangerous trades, infectious diseases, construction of general hospitals, infectious diseases hospital, private hospitals, public buildings, houses, boarding-houses, eating-houses, common lodging-houses. The main provisions of the Health Acts of each State are similar and comprise the following :

(a) *Nuisances.* — Duty of councils is to maintain cleanliness and prevent nuisances ; to make inspections and enquire into complaints ; to take steps to abate nuisances if existing.

(b) *General Sanitary Provisions.* — Council is to provide for removal of refuse and night-soil (see footnote on page 22).

Septic-tank systems are not to be installed without written permission from council.

Council may be required to cleanse offensive water-courses.

Councils are to so construct sewers and drains and maintain them so as not to be a nuisance.

Water supplies are to be prevented from pollution.

Polluted reservoirs and wells may be closed.

Councils may prohibit animals being kept near sources of water supply.

Council is to fix limits within which it is unlawful to keep swine.

Provisions are made for keeping of cattle on butchers' premises.

(c) *Offensive Trades, Dangerous Trades and Cattle Sale Yards.* — Offensive trades are not to be established or extended without the consent of the council.

Offensive trades must be registered with the council and constructed in accordance with the Act.

Dangerous trades are to be carried on only in registered premises and under prescribed conditions.

Cattle sale yards can only be established by consent of council, subject to registration and conditions of construction.

(d) *Infectious Diseases.* — Council must provide accommodation for members of a family whose premises are being disinfected by council on account of infectious disease.

The Minister may intervene where the council fails to adequately deal with an infectious disease.

Medical officers of health may enter and inspect premises and examine persons suspected of suffering from any such disease.

Medical officers of health may order any person suffering from any infectious disease to be removed to a suitable hospital or place of isolation.

In emergency, the Minister may authorise Commission to exercise special powers or to delegate such powers to any council or officer.

Compensation is to be paid to the owner of buildings or things destroyed by order of Commission.

Notification : Medical practitioners are required to notify cases of infectious disease to council.

(e) *Hospitals for Infectious Diseases.* — Councils are empowered to provide hospitals for cases of infectious disease.

(f) *Private Hospitals.* — Provision is made for registration.

(g) *Public Buildings.* — Plans of public buildings require approval by Commission. Public buildings require registration if for amusement purposes and of a permanent character.

(h) *Houses.* — The Council is empowered to give notice to owners and occupiers of houses certified unfit for habitation, requiring them to be rendered fit for occupation.

(i) *Boarding Houses.* — Registration is necessary with the council, and compliance must be made with prescribed conditions as to numbers accommodated, sanitary construction, etc.

(j) *Common Lodging Houses.* — Registration is necessary with the council, and compliance must be made with prescribed conditions as to the numbers accommodated, cleanliness, ventilation, disinfection, etc.

(k) *Eating-houses.* — Eating-houses require to be registered with council and comply with prescribed conditions.

(l) *Food and Drugs.* — Food and drugs are to be of proper bulk, weight and volume, substance and quality.

Protection is provided from sale of milk from diseased cows and from unwholesome food.

Ice-cream and aerated-water factories must be registered.

Control is exercised in regard to proprietary medicines.

Councils must submit annually for analysis specified number of samples of food and drugs in proportion to the population.

(m) *Food Standards Committee.* — This committee advises only in respect of standards for foods and drugs.

(n) *Meat Supervision.* — Meat areas are continued and others may be proclaimed.

Meat is inspected and branded.

Meat inspection depots may be provided.

(o) *Rats, Flies, Mosquitoes, etc.* — Regulations covering destruction and control are to be carried out by the council.

2. *Food and Drugs Act.*

Each State department is given the control of sale of food and drugs either in the Public Health Act or by a separate Act.

3. *Venereal Diseases.*

Each State excepting South Australia has an Act providing for notification and treatment of venereal diseases. This Act is administered by the Department of Health in Western Australia, Victoria, Queensland and Tasmania. In New South Wales a commissioner is appointed to act under the Minister of Public Health. South Australia has passed an Act but it is not yet in operation.

4. *Midwifery Nurses.*

Registration is controlled by the Department of Health in all States excepting South Australia, where a special Nurses' and Midwives' Registration Board is appointed.

5. *Medical Inspection of School-children.*

In Western Australia this work is controlled by the State Department of Health. In each other State the control is by the Education Department.

6. *Dairy Control and Supervision.*

In Western Australia, New South Wales and South Australia, this control is exercised by the Department of Health. In Tasmania, registration of dairies is under the Health Act, whilst the Agricultural Department controls places where dairy produce is produced. In Victoria and Queensland, controls and supervision is exercised by the Department of Agriculture, but in Victoria, distribution is supervised by the Health Commission.

7. *Sale of Poisons.*

In Queensland and South Australia, control is exercised by the Department of Health. In other States, pharmacy boards have this control.

8. *Bacteriological Laboratory.*

In Queensland, New South Wales, Western Australia and Tasmania, a bacteriological laboratory for diagnosis of pathological specimens, etc., is provided by the Department of Health in the capital city. In Victoria, a similar institution is maintained by the University of Melbourne, and in South Australia by the Adelaide Hospital. The laboratories maintained by the Commonwealth Department of Health are referred to on page 15.

9. *Tuberculosis.*

Public sanatoria are provided in each State. In New South Wales, Victoria, Western Australia and Queensland, these are maintained by the Department of Health as departmental institutions.

10. *Public Hospitals.*

In New South Wales, the Director-General of Health controls State hospitals and asylums. In Western Australia, the department has a medical branch controlling Government hospitals, and certain charitable homes. Subsidies to public hospitals also come under the department's control. In Tasmania, subsidies to public hospitals are controlled by the department which administers the Hospitals Act.

11. *Industrial Control.*

In Western Australia, the Department of Health administers the Factories and the Early Closing Act. In Victoria, the Department of Health has control of

notification of certain industrial diseases, and investigations are carried out in co-operation with the Labour Department. Excepting in Western Australia, Factories Acts and industrial legislation are not controlled by the Departments of Health.

12. *Mental Hospitals.*

In Tasmania, the Department of Health administers the Mental Deficiency Act, which makes special provision for education and control of deficients. This department also exercises control over the Government Mental Hospital.

13. *Cemeteries and Crematoria.*

In New South Wales, crematories (but not cemeteries) come under the Health Act. In Victoria, the Cemeteries Act is administered by the Health Department. In Queensland, crematories and in South Australia and Tasmania cemeteries and crematories must be approved by the chief health officer.

CHAPTER II. SANITARY ENGINEERING.

Water Supply.

As already noted on page 27, under the Public Health Acts of the several States, amongst the general sanitary provisions are those relating to the functions of local authorities in regard to the prevention of pollution of water-supplies, the closing of polluted reservoirs and wells, and the cleansing of offensive water-courses. Under the Local Governments Acts of the several States, there are provisions empowering local authorities to make by-laws regulating the supply and distribution of water, with power to raise a special water rate.

The delegation of control to various water authorities varies in each State ; the authorities concerned may be summarised as follows :

New South Wales.

Metropolitan Area. — Control is vested in the Metropolitan Board of Water Supply and Sewerage of seven members, three being appointed by the Governor and two members each from the city and suburbs representing the municipalities concerned.

Newcastle and Suburbs. — The authority is the Hunter River Water Supply and Sewerage Board, of seven members constituted as in the Metropolitan Board.

Country. — Waterworks are constructed by the Public Works Department and when completed handed over to the municipalities concerned, by whom the cost is repaid and administration carried out. Up to June 30th, 1923, waterworks had been completed in sixty-three towns and handed over to the respective municipal or shire authorities. Special administration is, however, in force in the towns of Junee, Grafton and Broken Hill.

Victoria.

Metropolitan Area (thirteen miles radius from the General Post Office). — Control is vested in the Melbourne and Metropolitan Board of Works of forty members, representing the various municipal councils. This board is also empowered to supply certain municipalities outside the thirteen-mile radius and to arrange for bulk supplies of water to certain other shires.

Ballarat. — The local water authority is the Ballarat Water Commission and Sewerage Authority, which consists of seven members, three appointed by the Government and four by the Council of the City of Ballarat.

Geelong. — The local authority is here the Geelong Waterworks and Sewerage Trust, of five commissioners, representing the local authorities concerned.

Country. — Most of the country waterworks are controlled by the State Rivers and Water Supply Commission, but a number of other waterworks are controlled by waterworks trusts or by municipal corporations.

Queensland.

Metropolitan Area. — Control is exercised by the Metropolitan Water Supply and Sewerage Board, Brisbane, which consists of a chairman nominated by the Governor and eight members elected by the ratepayers of the district.

Country Towns. — At the end of 1922, there were thirty-one towns in Queensland provided with water-supply systems constructed and maintained by municipalities. The Commissioner of Irrigation exercises control over all water-courses and catchment areas.

South Australia.

The whole of the water-supply systems are constructed and maintained by the Public Works Department.

Western Australia.

The water-supply systems are all under the management of Government departments and are divided into the following categories : *(a)* Metropolitan ; *(b)* Goldfields ; *(c)* Other Towns ; *(d)* Agricultural Water Supply ; *(e)* Other Mines Water Supply ; and *(f)* Artesian and Sub-Artesian Waters. The control of all works are vested in a Minister for Water Supply, Sewerage and Drainage.

Tasmania.

Metropolitan. — Both the Hobart and Launceston water-supplies are vested in the city councils.

Country Towns. — Special Acts have been passed from time to time authorising the construction of water-works in various places by trustees elected by ratepayers. In 1908, the majority of these water-works were transferred to municipal councils, the minority still remaining under the control of trusts.

The majority of the water-supply systems in Australia consist of reserved catchment areas, with storage and service reservoirs from which distribution is effected by channels and reticulation mains. The early reservation of large catchment areas in sites adjacent to developing centres of population has resulted in water of good quality being available, consequently artificial purification has not been widely adopted. In 1923, the average daily supply per head of population varied from 35 gallons in Newcastle to 60 gallons in Melbourne. Chemical and bacteriological analyses are made regularly at frequent intervals and are for the most part satisfactory.

In country areas, home water-supplies are available from wells or from the more common iron tank filled from roof catchment.

Sewerage and Drainage.

As with water-supply, the administration of sewerage and drainage systems in the States is allocated to various authorities, either or both under the respective State Health Acts or the Local Government Acts, or under separate Drainage and Sewerage Acts.

The delegation of authority in connection with installation and maintenance of sewerage systems might be summarised as follows, the constitution of joint water-supply and sewerage boards having already been noted :

New South Wales.

Metropolitan Area. — Metropolitan Board of Water Supply and Sewerage.

Newcastle and Suburbs. — Hunter River Water Supply and Sewerage Board.

Country. — Under the Local Government Act of 1919, the Public Works Department may, upon application by any municipal council, construct sewerage works and when completed transfer the control thereof to the council. At the end of June 1923, sewerage and storm-water drainage works were completed in twenty municipalities within the State.

Victoria.

Metropolitan Area. — Melbourne and Metropolitan Board of Works.

Ballarat. — Ballarat Water Commission and Sewerage Authority.

Geelong. — Geelong Water Works and Sewerage Trust.

Bendigo. — Bendigo Sewerage Authority, which consists of members of the City Council.

In Victoria, sewerage comes under the Sewerage Districts Act ; the definition of requirements as to quality and quantity of sewage to be discharged is variously under the Health Act and the Water Act.

Queensland.

Metropolitan Area. — Metropolitan Water Supply and Sewerage Board.

South Australia.

All sewerage systems are constructed and maintained by the Public Works Department, which has power to levy sewerage rates.

Western Australia.

Metropolitan Area. — Metropolitan water-supply, sewerage and drainage come under the administration of the special Minister and a Government department.

Tasmania.

The control of the sewerage systems in Hobart and Launceston are vested in the respective City Councils.

Control of the installation of house drainage and its maintenance so as not to become a nuisance is a function of the local health authority, as already noted on page 27.

Night-Soil Disposal.

The responsibility for night-soil removal in each State is placed on the local authority, which is empowered to collect a sanitary rate for the purpose. The legal provision is included either in the Health Acts or the Local Government Acts (or sometimes in both) of the various States. Supervisory power in respect to the service provided and the disposal area is vested in the State Health Department. Regulations under the Health Acts prescribe details for construction of privies. The usual system adopted throughout Australia is that of the double-pan service. This service consists of a prescribed type of pan which, on collection, is replaced by a clean pan. The filled pan is then covered with a lid and removed for disposal. The standard pan or pail is obviously a necessity in this service, which obviates fouling by spilling of the contents on the premises of householders. In some areas provision is made for mixing dry earth or sawdust with the contents of the pan. Disposal is effected at approved sites by trenching, incineration or in some seaports by disposal at sea. Installation of septic-tank systems must be approved by the local authority and similarly control is exercised over the installation of chemical closets or other methods of disposal in unsewered areas.

Garbage Collection and Disposal.

The collection and disposal of garbage and refuse is dealt with either in the Health Acts and Local Government Acts of the various States (or sometimes in both), the responsibility being placed on the local authority. To provide for the scavenging

services, the levy of a special cleansing rate is usually provided for. Disposal is effected by incineration either at " tips " at approved sites or in special plants installed by the council.

Noxious Trades.

The control of noxious trades is provided for in the Health Act or special Noxious Trade Act in each State. The Act usually defines those trades proclaimed as noxious trades. The local authority must give approval prior to the establishment of and register all such trades. A special area is usually defined by by-law or proclaimed by the Governor on advice of the chief health officer of the State.

CHAPTER III. BUILDING CONSTRUCTION.

Under the Acts relating to local government, building, etc., the local authorities in the several States are empowered to make by-laws regulating buildings in regard to areas, building materials, dangerous or dilapidated structures, etc. In regard to specified classes of buildings, various regulations are in force under different Acts.

Private Houses.

Supervision of housing is provided for in the Health Act of each State in that the council is empowered to give notice to owners and occupiers of houses certified unfit for habitation, requiring them to be rendered fit for occupation.

Public Buildings.

Under the Health Acts of the several States, plans of public buildings require approval by the State Health Department and public buildings require registration if for amusement purposes and of a permanent character. Under Acts relating to local government, theatres or places of public entertainment, the use of non-inflammatory materials, means of ingress and egress, etc., are provided for, under the administration of the local authority.

Boarding-Houses, Common Lodging-Houses and Eating-Houses.

Under the Health Acts of the several States, provision is made for registration by the local authority and the enforcement of compliance with prescribed conditions.

Town-Planning.

The wider scope of building in relation to the public health is evidenced by the interest displayed in town-planning under the stimulus of active Town-Planning Associations. The local authority is developing as the town-planning authority. In Victoria, a Commission of Town-Planning is maintained jointly by the municipalities.

CHAPTER IV. FOOD AND DRUGS.

Commonwealth Jurisdiction.

Under the constitution of the Commonwealth, the Commonwealth Parliament has power to make laws with respect to trade and commerce with other countries and among the States. By virtue of that power, the Federal Parliament passed the Commerce (Trade Descriptions) Act 1905. This Act gives power to prohibit the importation of articles used for food or drink by man or in the manufacture or preparation of articles so used, and of medicines or medicinal preparations for internal or external use, unless there is applied to the goods a " trade description " referred to in the Act. Provision is made for the inspection of all prescribed goods which are imported or which are entered for export. The Act is administered by the Department of Trade and Customs, which is in close relationship in regard to reference and consultation with the Commonwealth Department of Health.

In connection with foods entered for export, the administration by the Department of Trade and Customs in relation to international commerce is in regard to the legal requirements of the oversea countries to which such foods are consigned.

State Jurisdiction.

The inspection and sale of food and drugs are dealt with in each State either under the Health Acts or under Pure Food Acts. The work is carried out in each State by the executive officer of the Health Department. There is, in addition, a number of Acts dealing with special matters, such as the adulteration of wine and the oversight of bread and meat supply. The supply and sale of milk are also subject to special regulations or to the provisions of special Acts.

The general objects of these Acts are to secure the wholesomeness, cleanliness and freedom from contamination or adulteration of any food, drug or article, and the cleanliness of receptacles, places and vehicles used for their manufacture, storage or carriage. The sale of any article of food or any drug which is adulterated or falsely described is prohibited, as also is the mixing or selling of food or drugs so as to be injurious to health.

Power is given to any authorised officer to enter any place for the purpose of inspecting any article to be used as a food or drug, and also to inspect articles being conveyed by road, rail or water. The officer may take samples for analysis or examination and may seize for destruction articles which are injurious to health or unwholesome. Special provision is generally made in the Acts with regard to the sale of preservatives and disinfectants.

In every State except Queensland, advisory committees have been appointed for the purpose of prescribing food standards and for making recommendations generally with a view to carrying out the provisions of the Act. The duty of enforcing these regulations is entrusted to the local authorities.

Food and Drug Standardisation.

Conferences with the object of securing uniformity in these matters were held in Sydney in 1910 and in Melbourne in 1913. The resolutions of the latter conference were submitted to the Premiers' Conference held in Melbourne in March 1914, and, in conformity with the determinations arrived at, each State issued regulations which have had the effect of ensuring uniformity throughout Australia.

Sale and Custody of Poisons.

In New South Wales, Victoria, Western Australia and Tasmania, the enactments for regulating the sale and use of poisons are administered by the Pharmacy Boards in the respective States. In South Australia, the sale of poisons is provided for by regulations under the Food and Drugs Act 1908, administered by the Central Board of Health. In Queensland, the sale of poisons is under the control of the Health Department. In New South Wales and Tasmania, the Government subsidizes the Pharmacy Board in order to enable it to carry out the provisions of the Poisons Act. The subsidy to the Victorian Board was withdrawn in March 1921, provision having been made for the payment of a licence fee of 10 shillings under the Poisons Act 1920.

CHAPTER V. DAIRIES AND MILK SUPPLY.

In the various States there is legislation in force relating to supervision to ensure the purity of the milk supply and of dairy produce generally, the legislation being administered variously between the Health Departments and the Departments of Stock and Agriculture.

New South Wales.

The legislation in this State is administered by the Department of Public Health.

The provisions of the Dairies Supervision Act 1901 extend to the whole of the eastern and central divisions and to all important dairying districts further inland. Other districts are brought under the operation of the Act by proclamation from time to time. Every dairyman, milk vendor and dairy factory or creamery proprietor is required under penalty to apply for registration to the local authority for the district in which he resides and also to the local authority of every other district in which he trades. Registration must be applied for prior to commencing trade and must be renewed annually. The Chief Dairy Inspector is in charge of all inspectorial work under the Dairy Supervision Act 1901, and has assisting him 14 qualified dairy inspec-

tors, each in charge of a district. During 1923, samples of milk numbering 15,360 and of food and drugs numbering 415 were taken from the vendors for examination and 11,910 dairy premises were inspected. Where necessary, warnings and prosecutions followed. A sum of over £3,000 was imposed in fines for adulteration, want of cleanliness, etc.

Victoria.

The registration, inspection and supervision of dairies, dairy farms, dairy produce, milk-stores, milk-shops, milk-vessels, dairy cattle and grazing grounds are provided for by the Dairy Supervision Act 1915 and the Milk Supply Act 1922, administered by the Minister of Agriculture. Under the Health Act, however, the Department of Public Health is empowered to take samples of food (including milk, cream, butter, cheese, and other dairy products) for examination or analysis, and to institute prosecutions in case of adulterated or unwholesome food. During the first six months of 1922, 427 samples of milk were analysed by the Public Health Department. By the end of the year 1922, 117 municipal districts, comprising about one-third of the area of the State, had been brought under the operation of the Dairy Supervision Act. The municipal councils have the option of carrying out the administration of the Act or of deciding that the work should devolve upon the Department of Agriculture ; up to the present all the municipalities in which the Act has been proclaimed have elected for departmental administration.

The Milk Supply Act 1924 provides for the appointment of a Milk Supply Committee, with power to issue regulations to govern the milk supply of the metropolis, and to disseminate information concerning the best methods of handling the product.

The council of any metropolitan municipality, or a group of councils acting together, may establish depots at which milk may be brought, traded and sold. The committee may, however, issue certificates authorising persons to sell milk, but, in an area in which there is a municipal depot, no milk may be sold unless it has been treated in a depot or, by approved methods, in a factory. Milk sold in containers must have the grade specified on the label. A laboratory is established to carry out researches in matters related to milk and the milk supply.

Queensland.

The control and supervision of the milk supply, of dairies and of the manufacture, sale and export of dairy produce are provided for by the Dairy Produce Act 1920 administered by the Department of Agriculture and Stock. This Act and the regulations made thereunder apply only to prescribed areas which comprise the whole of the coastal district from Rockhampton down to the New South Wales border, and the Darling Downs, Maranoa, Mackay and Cairns District. In certain proclaimed areas the sale of milk is restricted to persons licensed under the Milk Sellers' Regulations of 1917. Milk for sale is supervised by inspectors of the Health Department under the Health Acts 1900-1922. During the year ended June 30th, 1923, 764 samples of milk were analysed.

South Australia.

The Food and Drugs Act 1908 and the regulations made thereunder provide for the licensing of vendors of milk and the registration of dairies, milk-stores and milk-shops. The Metropolitan County Board carries out the requirements of the metropolitan area. In the country, the majority of local authorities have not made statutory provision for the licensing of vendors of milk and the registration of dairy premises ; and in consequence, the Central Board of Health provides for such under the Act.

Western Australia.

Under the provisions of the Health Act, control of dairies throughout the State is in the hands of the public health authorities. The premises of dairymen and milk vendors must be registered by a local authority. The inspectors under the Act supervise the sanitary conditions of the premises, the examination of the herds being carried out for the Health Department by officers of the Department of Agriculture. Inspection of herds is made at regular intervals and the tuberculin test is applied in cases of suspected disease.

Tasmania.

Local authorities are responsible for the dairies in their respective districts. By-laws for the registration and regulation of dairies have been drafted by the Public Health Department and in the majority of cases have been adopted by the local authorities. By the Food and Drugs Act, which came into force in March 1911, milk-sampling is carried out by the local authorities. During 1913 attention was drawn by circular to the requirements of local authorities with regard to dairies, and a special report is now required before licences are granted. An Act also provides for the registration and inspection of dairies and other premises where dairy produce is prepared, and regulates the manufacture, sale and export of such produce.

CHAPTER VI. INDUSTRIAL HYGIENE.

In Western Australia alone is the administration of factory legislation vested in the State Health Department. In Victoria, however, the Department of Public Health controls notification of certain industrial diseases, and investigations are carried out in co-operation with the Labour Department. In New South Wales, the Public Health Department may submit only recommendations to the Minister in respect of the Factories and Shops Acts, but a special medical officer has recently been appointed to deal with questions related to industrial hygiene. The establishment and functions of the Division of Industrial Hygiene in the Commonwealth Department of Health ave already been referred to on page 15.

Excepting Western Australia, the administration of legislation related to industrial hygiene is vested in the State Departments of Labour and Industry. Excepting the medical officers of the Health Departments of New South Wales and Victoria who carry out duties in this connection and the certifying surgeons mentioned in the Acts of Victoria and South Australia who function in regard to certificates of fitness for work of young persons, no staff medical officers are attached to these Departments of Labour. There has recently been, notably in New South Wales, a forward movement in regard to the training and education of the inspectorial staffs of the State departments. In many large industries, corporation medical, nursing and even dental staff have been appointed in connection with health work amongst employees.

It may be stated generally that the industrial legislation of the Australian States provides a relatively high standard in respect of : *(a)* hygiene of factories, workshops and mines ; *(b)* conditions of employment of women and children ; and *(c)* supervision of the health of workers in regard to workshop environment, hours of labour, first-aid facilities, etc. A conspectus of laws relating to conditions of labour in Australia is contained in the *Official Year-Book of the Commonwealth of Australia*, No. 16. 1923, p. 538 *sqq*.

CHAPTER VII. INFECTIOUS DISEASES.

1. Quarantine.

The provisions made against the introduction of exotic disease from oversea have already been referred to in Chapter I in discussing the functions of the Commonwealth Department of Health. Interstate quarantine is also a function of the Commonwealth. Provision is made in the Quarantine Act and regulations for the notification to the Commonwealth authority of quarantinable disease that may occur in Australia. The quarantinable diseases within the meaning of the Act are : plague, cholera, smallpox, typhus fever, yellow fever and leprosy, whilst encephalitis lethargica has been proclaimed a quarantinable disease since 1919.

2. Prevention and Control of Infectious Diseases.

Provision exists in the Health Acts of all the States for precautions against the spread and for the compulsory notification of infectious diseases. When any such disease occurs, the Health Department and the local authorities must at once be notified. In some States, notification need only be made to the latter. The duty of giving this notification is generally imposed, first, on the head of the house to which

the patient belongs, failing whom, on the nearest relative present, and, on his default, on the person in charge of or in attendance on the patient, and, on his default, on the occupiers of the building. Any medical practitioner visiting the patient is also bound to give notice.

As a rule, the health authorities are required to report from time to time to the central health authority in each State as to the health, cleanliness and general sanitary state of their several districts, and must report the appearance of certain diseases. Regulations are prescribed for the disinfection and cleansing of premises, and for the disinfection and destruction of bedding, clothing, or other articles which have been exposed to infection. Bacteriological examinations for the detection of plague, diphtheria, tuberculosis, typhoid and other infectious diseases within the meaning of the Health Acts are continually being carried out. Regulations are provided in most of the States for the treatment and custody of persons suffering from certain dangerous infectious diseases, such as smallpox and leprosy.

New South Wales.

The proclamation and notification of infectious diseases are dealt with in Part II of the Public Health Acts 1902 and 1915. Notification of infectious disease must be made to the local authority by the head of the family, etc., and by the medical practitioner. Provision is made for the disinfection or destruction of premises. Restrictions are placed upon the attendance at school of children suffering from infectious disease or residing in a house in which infectious disease exists. Special provisions have been made with regard to typhoid fever, tuberculosis, smallpox and leprosy, and legislation has been passed dealing with venereal diseases.

Victoria.

Under the Health Act 1919, any disease may be declared to be notifiable throughout the State. The occupier of a house containing a case of infectious disease and also the medical practitioner must report the fact to the Council. The medical officer of health may order the removal of a patient to a hospital when such is available. The occupier of the house must also inform the head teacher of the school of any child suffering from notifiable disease or residing in an infected dwelling. The notification of venereal disease is dealt with in the Venereal Diseases Act 1916.

Queensland.

Part VII of the Health Act 1917-22 stipulates that all cases of infectious disease must be notified by the occupier of the house and by the medical practitioner attending the case. Restrictions are placed on the attendance at school of children suffering

from a notifiable disease. Special measures must be taken against typhoid fever, smallpox and venereal disease. Leprosy is dealt with under the Leprosy Act 1892.

South Australia.

Cases of infectious disease must be reported to the local board, under the provisions of Part VIII of the Health Act 1898. The duty of notification rests primarily on the head of the family and, in addition, the medical practitioner must report the case. Children suffering from or resident with a person suffering from an infectious disease must not attend school till they hold a certificate that there is no risk of infection. Venereal diseases will be dealt with under the provisions of the Venereal Diseases Act 1920, which, however, is not yet in operation.

Western Australia.

The Health Acts 1911-22 provide for the notification and control of infectious diseases, including venereal diseases. The occupier of a house containing a case of infectious disease and the medical practitioner must report the case to the local authority. Children may not attend school within three months of suffering from any infectious disease unless they possess a certificate of freedom from in ection. Special provisions apply to typhoid fever, tuberculosis and venereal disease.

Tasmania.

The provisions regarding the notification and prevention of infectious diseases are contained in the Public Health Act 1903 and amending Acts. Notification of cases devolves upon the medical practitioner or the occupier of the house. Special measures are provided for dealing with typhoid fever, smallpox and venereal diseases.

3. Diseases notifiable in Each State.

In the following statement the diseases notifiable in each State are indicated by a cross :

DISEASES NOTIFIABLE UNDER THE HEALTH, ETC. ACTS IN EACH STATE.

Particulars	N.S.W.	Vic.	Q'land.	S. A.	W. A.	Tas.
Acute Lobar Pneumonia	—	—	—	[2]	×	—
Anthrax	—	×	—	×	×	—
Ankylostomiasis	—	×	×	—	—	—
Beri-beri	—	—	—	—	×	—
Bilharziasis	—	×	×	×	×	×
Bubonic Plague	×	×	×	×	×	×
Cerebro-spinal Fever	×	×	×	×	—	—
Cerebro-spinal Meningitis	×	×	×	×	×	×
Chicken-pox	—	—	—	×	—	—
Cholera	—	×	×	×	×	×
Colonial Fever	—	—	—	—	×	—
Continued Fever	—	—	×	—	×	—
Dengue Fever	—	—	—	—	×	—
Diphtheria	×	×	×	×	×	×
Dysentery	—	×	×[1]	—	×	—
Encephalitis lethargica	—	×	—	—	—	×
Enteric Fever	×	×	×	×	×	×
Erysipelas	—	—	×	×	×	—
Favus	—	—	—	×	—	—
Hæmaturia	—	—	×	—	×	×
Infantile Paralysis	×	×	×	—	×	×
Influenza	—	—	—	×[2]	×	—
Leprosy	×	×	×	×	×	×
Low Fever	—	—	—	—	×	—
Malarial Fever	—	×	×	×	×	×
Malta Fever	—	—	—	—	×	—
Measles	—	—	—	×	—	—
Membranous Croup	×	—	×	×	×	—
Pneumonic Influenza	—	—	—	×[2]	×	×
Polio-encephalitis	—	×	—	—	—	—
Poliomyelitis anterior acuta	×	×	×	×	×	×
Puerperal Fever	—	×	×	×	×	×
Pulmonary Tuberculosis (Phthisis)	×[1]	×	×	×	×	×
Pyæmia	—	—	—	—	×	—
Relapsing Fever	—	—	×	×	×	—

[1] Notifiable in certain areas only.
[2] In South Australia, influenza vera is notifiable and any febrile toxic-septicæmic condition similar to influenza, including pneumonic influenza.

Particulars.	N.S.W.	Vic.	Q'land.	S.A.	W.A.	Tas.
Scarlet Fever	×	×	×	×	×	×
Scarlatina	×	×	×	×	×	×
Septicæmia	—	—	—	—	×	—
Smallpox	×	×	×	×	×	×
Trichinosis	—	—	—	×	—	—
Tuberculosis	—	×	—	—	—	—
Tuberculosis in Animals	—	—	—	×	—	—
Typhoid	×	×	×	×	×	×
Typhus Fever	—	×	×	×	×	×
Venereal Diseases :						
Chancroid (Soft Chancre)	×	×	×	×[2]	×	×
Gleet	×	—	—	×[2]	×	—
Gonorrhœa	×	×	×	×[2]	×	×
Gonorrhœa Ophthalmia	×	—	—	×[2]	×	—
Infective Granuloma of the Pudenda ..	×	×	×	×[2]	×	—
Ophthalmia neonatorum	—	×	—	—	×	×
Syphilis	×	×	×[1]	×[2]	×	×
Venereal Warts	×	—	×	×[2]	×	—
Whooping-cough	—	—	—	×	—	—
Yellow Fever	—	×	×	×	×	—

[1] Primary and secondary stages only.
[2] Act not yet in operation.

4. Tuberculosis.

There is no compulsory segregation of cases of tuberculosis, which is a notifiable disease in each State. Provision is made for sanatorium and hospital treatment, and in Victoria and Queensland there are special tuberculosis bureaux of the Public Health Departments.

5. Leprosy.

Lazarets for the control and treatment of lepers exist in New South Wales (Little Bay), Queensland (Peel Island), Western Australia (Derby) and the Northern Territory (Darwin). These lazarets are under the administration of the respective State and Territory health authorities.

6. Vaccination.

In New South Wales there is no statutory provision for compulsory vaccination, though in all the other States such provision has been made. At the present time, however, completely compulsory enforcement of vaccination does not exist in any State. Jennerian vaccine for vaccination against smallpox is prepared at the Commonwealth Serum Laboratories at Melbourne.

New South Wales.

Although there is no provision for compulsory vaccination, public vaccinators have been appointed. No statistics are available of the proportion of the population who have been vaccinated.

Victoria.

Compulsory vaccination subject to a " conscience " clause is enforced throughout the State under Part VII of the Health Act 1918. Free lymph is provided. From the year 1873 to 1918 it was estimated that 72 per cent of the children whose births were registered were vaccinated. The number of children vaccinated in 1923 was 2,149, or about 6 per cent of the births registered.

Queensland.

Although compulsory vaccination is provided for under Part VII of the Health Act 1900-22, its operation has never been proclaimed. Vaccination thus being purely voluntary, medical practitioners do not notify vaccinations.

South Australia.

The Vaccination Act 1882 is administered by the vaccination officer of the State. Under this Act vaccination was compulsory, but in 1917 an Act to inspect compulsory vaccination was passed. There were no vaccinations reported in 1923.

Western Australia.

Vaccination is compulsory under the Vaccination Act 1878, which, however, remains almost a dead letter, seeing that, under the Health Act 1911, a " conscientious objection " clause was inserted, which is availed of by the majority of parents. The number of children vaccinated is very small. All district medical officers are public vaccinators, but without fees.

Tasmania.

All infants are nominally required under the Vaccination Act 1898 to be vaccinated before the age of twelve months unless either : *(a)* a statutory declaration of conscientious objection is made ; or *(b)* a medical certificate of unfitness is received. Information in regard to vaccinations in recent years is not available.

CHAPTER VIII. VENEREAL DISEASE.

The prevention and control of venereal diseases are undertaken by the State. Each State has a Venereal Diseases Act, or provisions in the Health Act govern the working of the measures taken to combat these diseases. In each State, anonymous or impersonal notification has been made compulsory. A list of the notifiable forms of venereal complaints has been shown on page 43. Steps have been taken to ensure free treatment by medical practitioners or in subsidised hospitals. Registered pharmaceutical chemists are allowed to dispense prescriptions only when signed by medical practitioners. Clinics have been established and, in some cases, beds in public hospitals have been set aside for patients suffering from these diseases.

Penalties may be imposed on a patient who fails to continue under treatment. Clauses are inserted in the Acts which aim at preventing the marriage of any patient or the employment of an infected person in the manufacture and distribution of foodstuffs.

The Commonwealth Government has granted a subsidy of £15,000 per annum to the various States to assist in providing hospital treatment and administrative control. The supervision of the work, in so far as it relates to the expenditure of the subsidy, is undertaken by the Commonwealth Department of Health. In February 1922, a Commonwealth and States Conference was held to consider the means of securing the best results from this subsidy.

New South Wales.

The Venereal Disease Act 1918 came into operation on October 1st, 1920. The Act, which is administered by a Commissioner, aims at ensuring that all cases of venereal disease will have immediate and continued treatment. The Commissioner is attached to the office of the Director-General of Public Health. Clinics are being established at subsidised hospitals. Notification is compulsory ; a person suffering from the disease is required to place himself under the treatment of a medical practitioner or to attend a hospital within three days of becoming aware of the existence of the disease, and to continue treatment until a cure is effected. During 1924, the total notifications numbered 6,090. Satisfactory results are being obtained from action taken in cases where patients have been reported for failure to continue treatment as required by the Act. A number of prosecutions — all of which have been successful — has been undertaken for : *(a)* sale of drugs prohibited under the Act ; and *(b)* treatment of venereal disease by a person other than a medical practitioner.

Victoria.

Under the Venereal Diseases Acts 1916 and 1918, the control of venereal disease is undertaken by the Department of Public Health. The Act provides for compulsory

treatment by qualified medical practitioners of all persons suffering from the disease. All hospitals in receipt of State aid treat patients. Three evening and three day clinics have been established at hospitals in Melbourne and in June 1918 a special departmental clinic was instituted. Notification of the disease is compulsory, and 5,264 cases were notified in 1924.

Queensland.

The Health Act 1900-22 confers power on the Commissioner of Public Health to deal with the prevention and control of venereal disease, and affected persons must place themselves under treatment by a medical practitioner. Persons other than medical practitioners are prohibited from treating the disease. Subsidised hospitals are required to make provision for the examination and treatment of cases reported to them, and clinics have been established in Brisbane and seven towns. Notification is compulsory, and during the year 1924, 1,655 cases were reported. Examination of prostitutes is conducted at Brisbane and eight other towns by medical officers appointed under Regulation 10 of the Venereal Diseases Regulations of 1923.

South Australia.

The provisions of the Venereal Diseases Act 1920 (not yet in operation) are to be carried out by the Inspector-General of Hospitals. The Minister administering the Act may arrange with any public hospital to provide free accommodation and treatment, and may also establish hospitals and arrange for free examinations and free supply of drugs. Persons suffering from venereal disease will be compelled to consult a medical practitioner or attend a hospital and place themselves under treatment. No person other than a medical practitioner may attend or prescribe for patients.

Western Australia.

The Health Act gives power to the Commissioner of Public Health to deal with venereal diseases, and persons suffering from these diseases must consult a medical practitioner and place themselves under treatment. No treatment may be given except by qualified medical practitioners. Free examination and treatment are given by subsidised hospitals.

Tasmania.

The Public Health Act 1917-18 authorised the Director of Public Health to take steps for the control of venereal diseases, and persons affected must place themselves under the care of a medical practitioner or of a hospital. The State-aided hospitals are required to provide treatment. During 1924, 516 cases were notified, the great majority of which received free treatment at the principal public hospitals.

CHAPTER IX. TROPICAL DISEASE AND HYGIENE.

Tropical diseases do not bulk largely in Australian mortality and morbidity reports, but considerable attention has been given to the determination of the incidence and distribution of disease in the tropical parts of Australia and into the problems of hygiene and sanitation in that zone.

Malaria.

Small endemic foci of malaria exist in parts of Queensland, Western Australia and the Northern Territory, and occasional limited outbreaks have occurred in these States. The Australian Institute of Tropical Medicine, Townsville, has carried out several surveys, both in regard to human carriers and the mosquito vector (on epidemiological grounds probably *Anopheles annulipes).* Malaria is a notifiable disease, but the total notifications for 1924 (including imported and recurrent cases) were only 37 cases in the whole of the Commonwealth.

In Queensland, comprehensive regulations give the local authority power to carry out anti-mosquito measures. In the Northern Territory, the Administration has taken measures for the destruction of mosquito larvæ wherever settlements or permanent camps are formed, and precautions are taken to prevent the collection of stagnant water in such localities. The control of returned soldiers suffering from malaria was successfully undertaken by the Commonwealth Department of Health working in co-operation with the Departments of Defence and Repatriation and the Health Departments of the several States.

Filariasis.

Filariasis has been determined by reports and surveys along the Queensland coast from Brisbane northwards, without any infection of the inland towns. In the Northern Territory cases are known to exist, although they are not numerous. Symptoms are infrequent, but the infection has been noted following cases of chyluria, " ideopathic " hydrocele, etc., although cases of elephantiasis are rare. Local authorities are responsible for anti-mosquito measures under the regulations. The Australian Institute of Tropical Medicine, Townsville, investigates and collects information relative to the distribution of filariasis in conjunction with the work of the hookworm campaign in the field.

Hookworm.

In October 1919, an Australian hookworm campaign commenced a survey of Australia, the campaign being conjointly supported by the Commonwealth, the Inter-

national Health Board of the Rockefeller Foundation, and the several States concerned. By the end of 1922 the survey of Australia and its dependencies had been completed. Endemic hookworm infection was found in intermittent areas along the eastern coast of Australia from Cape York to Macksville in New South Wales. The higher summer rainfall in these areas appears to be chiefly responsible for the localisation of the infection. Infection was also determined in the vicinity of Broome and Beagle Bay in Western Australia, in the northern (coastal) part of the Northern Territory and along the eastern coast of the Gulf of Carpentaria. Control work was continued in the infected areas, the treatment of cases and the improvement of sanitary conditions being the aim of the campaign. From October 1924, the Commonwealth Department of Health took over direction of the campaign, the direction of the work being performed by the Division of Tropical Hygiene of the department, the Australian Institute of Tropical Medicine at Townsville acting as a correlating centre. Co-operative arrangements exist between the Departments of Health and of Public Instruction in New South Wales and Queensland for rendering mutual assistance and for making available the information obtained in the course of the work. The funds available are contributed respectively by the Commonwealth and the States of Queensland and New South Wales. Two units of trained field inspectors under medical officers are now in the field. The work being performed in infected areas consists of routine visiting, collection and examination of specimens, with treatment of those found infected. A privy survey is at the same time carried out, and the results found submitted to the State Health Department for action by the local authorities concerned. In less heavily infected areas, a school survey only is made. For this purpose, cooperation with the State Departments of Public Instruction is obtained. For the treatment of aboriginals, arrangements are made with the State Protectors of Aborigines. In the Northern Territory the work is carried out by special arrangement by the Administration, and in Western Australia by the State Health Department.

The Australian Institute of Tropical Medicine, Townsville.

The formulation of the policy and ideal of a White Australia has focussed attention on the problems of European settlement in the tropical belt of Australia. For the investigation of those problems relating to the pathology and the hygiene of tropical Australia, the Australian Institute of Tropical Medicine was established at Townsville, North Queensland, in January 1910. Since March 1921, the institute has been administered by the Commonwealth Department of Health as an integral part of the activities of the Division of Tropical Hygiene. Considerable investigational work has been performed at the institute, which continues to function as the main centre in Australia for research into tropical problems.

CHAPTER X. MATERNAL AND INFANT WELFARE.

During recent years there has been in Australia, as in other countries, a growing appreciation of the fact that the health of the community depends largely on pre-natal as well as after care in the case of mothers and children. Government and private organisations are taking steps to provide instruction and treatment for mothers before and after confinement, while the health and well-being of mother and child are looked after by the institution of baby health centres, baby clinics, crèches, visitation by qualified midwifery nurses, supervision of milk supply, etc. The British Medical Association in Australia, as the official organisation of the medical profession, has recently paid particular attention to questions related to maternal mortality, as evidenced by a valuable report compiled by a special obstetric enquiry committee of the Victorian branch. The realisation by the universities of the importance of obstetrical training in the medical curriculum is evidenced by the recent establishment of a Chair of Obstetrics in the University of Sydney and the appointment of a Director of Obstetrical Research in the University of Melbourne. Other agencies have similarly shown practical interest in this important phase of public health work.

There is for the most part little organic relationship between the Health Departments of the several States and the other governmental and private agencies connected with the supervision and care of the mother and child.

Care of the Mother.

The governmental activities in relation to the care of the mother, both before and during confinement, might be summarised as follows :

1. Subsidies to or establishment of *Maternity Hospitals or Wards* to which ante-natal clinics may be attached, the administration of such wards or clinics being vested in the hospital.

2. *Supervision of Midwives.* — In every State registration of midwives is provided for under the administration of the Health Department or a special board.

3. *Supervision of Private Hospitals.* — The Health Act of each State makes provision for the registration of and inspection of private hospitals, usually by the local authority, acting on the report of its medical officer of health or special inspector of the Health Department.

4. *Notification of Puerperal Sepsis.* — Puerperal sepsis is proclaimed as a notifiable disease in each State excepting New South Wales.

5. *Maternity Allowances.* — During 1912, the Federal Government passed an Act which provided for the payment of maternity allowances. The Act is administered by the Commonwealth Treasury Department. The most important conditions are that the sum of £5 is payable in the case of each confinement resulting in the birth of a viable child, whether such child was born alive or dead. The mother must be a native of the Commonwealth or intend to settle permanently therein. No payment is made in the case of an aboriginal or an Asiatic.

6. *Employment of Women.* — As far as Australia is concerned, it may be stated that the majority of married women who are potential mothers do not earn their living by their own individual efforts. Employment of women does not figure, therefore, as a cause of maternal mortality and morbidity. In the factory legislation, however, of New South Wales and Western Australia, provision is made for the prohibition of employment of women — in New South Wales for four weeks after her confinement, and in Western Australia for six weeks immediately prior to or after her confinement.

Supervision and Care of Infant Life.

In all the States, Acts have been passed with the object of supervising and ameliorating the conditions of infant life and reducing the rate of mortality. Government Departments control the boarding-out to suitable persons of the wards of the State, and wherever possible the child is boarded out to its mother or near female relative. Stringent conditions regulate the adoption, nursing and maintenance of children placed in foster-homes by private persons, while special attention is devoted to the welfare of ex-nuptial children. Registration of the birth of illegitimate children must be made within three days in Victoria and Queensland and fourteen days in Western Australia as compared with the 60 days (42 days in South Australia) permitted for nuptial births in the several States. Provision for the registration of still-births is made only in the Western Australian legislation.

In the *Official Year-Book of the Commonwealth* there is given a summary of the activities in the several States, showing the work performed by Government Departments and by various associations partly subsidised by the Government in financing their welfare work.

New South Wales.

Baby clinics were established by the Government in 1914. Attached to each clinic is an honorary medical officer and a staff of trained nurses who instruct mothers in matters pertaining to the care of themselves and their children. In 1923, there were 34 clinics in operation, of which 21 were in the metropolitan area and the remainder in important industrial and rural centres. In addition to the actual work at the clinic, home visits are paid by the nurses. No charge is made for attention or advice.

The Royal Society for the Welfare of Mothers and Children has two training-schools for nurses and two welfare centres in the metropolis. The Day Nursery Association maintains three nurseries where working mothers may leave their children during the day.

The Bush Nursing Association aims at providing fully qualified nurses in country districts throughout Australia. Centres may be formed in any district where the residents can enrol sufficient members to guarantee the salary of a nurse. As the greater part of the nurses' work is that of midwifery, the nurses must be registered midwives. In 1923, there were 27 bush-nursing centres in New South Wales.

Victoria.

The first centre of the Victorian Baby Health Centres Association was opened in 1917, and in 1923 there were 50 centres in operation, 38 in the metropolitan area and 12 in country towns. The association receives subsidies from the State Government and the local municipal councils. Visits are also paid to homes by the nurses of these centres. The Society for the Health of Women and Children also maintains five centres in the industrial suburbs of the metropolis. There are, in addition, crèches where children may be left while the mothers are at work. The Bush Nursing Association in 1924 had 47 centres in operation in the country districts.

Queensland.

Baby centres were established in Brisbane by the Government in 1918, and others have since been formed in six of the large provincial centres. A training-school has been organised to train nurses for welfare work. In addition to the work of the clinic the nurses pay visits to homes in connection with the after-care of mothers and infants.

There are in the metropolitan area five kindergartens and five crèches where children may be left during the day. The Playgrounds Association aims at providing playgrounds for children in the populous parts of towns and cities.

The Bush Nursing Association has ten nurses stationed in the country districts. The Countrywomen's Association is actively interested in work related to the welfare of women and children in rural districts.

South Australia.

A School for Mothers is situated in Adelaide and there are several branches in the suburbs and at Port Pirie and Renmark. These schools receive a Government and municipal grant. Visits are paid by trained nurses to expectant mothers and young babies in their homes. In 1921, baby clinics were established to which mothers can bring their babies for examination, advice and information. There is a crèche at South Adelaide for the benefit of the children of women obliged to earn their own living.

The District Trained Nursing Society has over 30 branches, of which half are in the metropolitan area. The nurses of this society are engaged in visits to homes. Nursing homes have been established by the Australian Inland Mission at Beltana and Oodnadatta in the far north of South Australia, and at three places in the Northern Territory.

Western Australia.

The organisations which aim at improving the conditions of infant life include an Ante-Natal Clinic established by the Government at the King Edward Maternity Hospital, a day nursery where children may be left and cared for while the mothers are away at work, and the Infant Health Association, which is subsidised by the Government and the local authorities and which maintains three centres with a specially trained nurse in charge of each.

The Bush Nursing Trust maintains a rest-home for expectant mothers, and the Australian Inland Mission has nursing homes at Hall's Creek and Port Hedland.

Tasmania.

There are three baby clinics at Hobart and two in Launceston controlled by the Child Welfare Association. Visits are also paid to homes by the nurses on the staffs of these clinics. The Bush Nursing Association, which is subsidised by the Health Department, the Red Cross Fund and municipal councils, has stationed nurses in eight country districts.

CHAPTER XI. MEDICAL INSPECTION OF SCHOOL-CHILDREN.

Medical inspection of school-children is carried out more or less thoroughly in all the States. Medical staffs have been established to deal with dental, ocular and other defects. Administration, excepting in Western Australia, is vested in the State Education Departments.

New South Wales.

Under the administration of the Education Department, in 1913 the School Medical Service was re-organised so as to embrace every pupil whose parents desired such inspection. During the three years ended 1922, the extra-metropolitan schools were visited for the third time, thus completing the third round of the State.

The staff of the service includes nineteen medical officers, eleven full-time and eight half-time dentists, nine nurses and fifteen dental assistants.

Provision is made for treatment of defects found by the departmental medical officers, by hospitals, lodge-doctors, etc. Eleven travelling dental clinics cover the whole extra-metropolitan area, while some provision for Sydney children is made at the metropolitan dental clinics. The travelling clinics concentrate on the earlier years of school life in the attempt to ensure a healthy permanent set of teeth to every child. In 1923, a school dental clinic was established at the out-patient department of the Royal Alexandra Hospital for Children (Sydney) with the idea of obtaining strict oral and dental cleanliness prior to operations on the nose and throat.

Victoria.

The medical staff of the Education Department consists of four medical officers, two dentists, three dental attendants and two school nurses. The system of medical inspection aims at examining the child three times in its school life, but in the High Schools the students are examined every two years. After the examination, the parents are notified of defects and are advised to obtain treatment from their own doctor or dentist, and in the metropolitan area two nurses follow up these cases. Attached to the department there is a dental centre, which deals with about 700 children each month from the metropolitan schools.

In remote country districts, the nurses of the Bush Nursing Association are co-opted to examine the school-children in their districts and to report to the medical officers of the Education Department, who, in their turn, advise whether medical attention is necessary.

Queensland.

In matters affecting the general administration of the medical branch of the Department of Public Instruction, the department acts on the advice of the Commissioner of Public Health. There is as yet no permanent professional officer in charge of the work, the medical inspection being carried out by part-time local medical practitioners who examine a large number of children each year and refer those who need treatment to the hospitals. A staff of eight dentists carries out dental inspection and treatment. Particular attention is paid to diseases of the eyes and tonsils. In the western districts, where ophthalmic diseases formerly were rife, the medical officers in charge of district hospitals are employed to treat cases promptly and thereby prevent spread of infection, whilst fly-prevention, screening of schools and other hygienic measures have been adopted.

South Australia.

The medical staff of the Education Department consists of one medical inspector, a dentist, two trained nurses and a disinfecting officer. Medical inspection embraces the examination, at least twice in their school life, of all children attending the primary schools and the report to parents of defects likely to interfere with educational progress. The dental officer attends remote country schools and treats children. The medical inspector meets the parents after the examination of the children, reports any defect and recommends treatment. It is found that a personal talk is of greater value than any written notice.

Western Australia.

Under the Public Health Act 1911-20, the medical officers of health appointed by the local authorities became medical officers of school and school-children. In the Public Health Department there is a special medical officer for schools whose duty is to conduct medical examinations and to co-ordinate the work in the State under the administration of the Commissioner of Public Health.

Tasmania.

To Tasmania belongs the credit of being the first State in Australia to provide for the systematic inspection of State-school children, as far back as 1906 1,200 children from the Hobart State schools having been examined. Under the administration of the Education Department, there are now two part-time medical officers, who conduct examinations of school-children in Hobart and Launceston. There are also four nurses, whose chief duty is to visit the homes to advise the parents as to the treatment of any defects disclosed by the medical examination. Country schools

are inspected by two whole-time medical officers. Dental clinics have been established at Hobart and Launceston, and two additional dentists have been appointed to visit the country schools.

CHAPTER XII. THE MEDICAL PRACTITIONER AND PUBLIC HEALTH.

In Australia there has been an interesting series of steps towards the realisation of the ideal inclusion of the general practitioner as a working organic element in the public health system. At the time of the influenza pandemic the Commonwealth Health Department summoned a conference of representatives of the State Departments of Health and representatives of the State branches of the British Medical Association. This was a new departure from established practice, as those conferences had previously consisted of officials only. In 1921, when plague appeared in Brisbane, this precedent was followed and a similar conference summoned. In 1922, at a Conference on Venereal Disease Control, the same constitution was adopted. In this way the importance of the practising profession in all public health matters was acknowledged and has been definitely established.

When, in 1921, the Commonwealth Department of Health was created, it was considered important to maintain regular contact with the organised profession, and the suggestion was made that the Commonwealth Director-General of Health might attend and an unofficial talk might be held with the Federal Committee of the branches of the British Medical Association in Australia on the occasion of each of its meetings, held every six months. These talks, informal and perhaps inconclusive, have continued until now ; and while there is little to show of a tangible kind, there is much to cause satisfaction in two directions. The much closer association developing between the official departments and the controlling body of the medical profession offers promise of a practical expression to the acknowledged community of interest. In addition, there has been close consideration by the profession of the individual responsibility and opportunity of training physicians in matters of public health administration and possible reform ; as a result, the following has been adopted by the Federal Committee of the British Medical Association in Australia for the consideration of the whole profession :

> " In no State is the service of the practising practitioner officially utilised for the prevention of diseases to any degree consistent with his knowledge and opportunity. Any scheme to rectify existing conditions (in respect of public health generally) must have as its immediate ideal . . . the linking-up of the general practitioner into active participation in the administrative scheme and the steady inculcation of the ideal of prevention rather than of carrying out regulations into both the actively administrative and actively practising members of the profession. On the medical side the unit is the medical practitioner, whether in general or special practice or acting as medical officer to industrial or school organisations or to institutions. In addition, to the treatment of his patients, he should :

"1. Notify to his district health officer on prescribed forms:

"*(a)* All births, still-births and miscarriages. Objection has been taken to this suggestion on the ground that it would be impossible to secure notification of miscarriages in single women. The force of this objection is recognised. If it is so strong that notification of miscarriages would be a dead letter, it had better be dropped. On the other hand, it must be recognised that the notification proposed is to a medical not lay authority and that, if the medical profession is to take its share in the lessening of criminal abortion, some such step will ultimately be necessary. Confidential notification of miscarriages by married women would frequently lead to the institution of treatment for otherwise overlooked maternal syphilis. Notification of still-births to the district medical officer would have the same effect. Notification of births to such authority would be of great value statistically and would assist in infant welfare objects.

"*(b)* All deaths. At present the death certificate is given to the relatives or undertaker and is largely formal. This practice would continue for burial purposes, but in addition, a confidential notification to be made to the medical officer, as is at present done in Switzerland, could often show the relation of the cause of death to a previous infection that is impossible now. This would afford more accurate statistical information and would make available a mass of information that is at present unutilised for public health purposes. The need is so greatly felt that some States already have a private arrangement between the principal medical officer of the State and the registrar of deaths by which the latter forwards to the former copies of certificates relating to deaths from infectious causes. The present suggestion would gain the same object in a much more direct and far-reaching way.

"*(c)* All cases of communicable disease prescribed by the regulations.

"*(d)* All cases of mineral (lead, etc.) or organic (alcohol, etc.) poisoning.

"2. Order in writing prescribed methods of concurrent and terminal disinfection in infectious cases. The methods would be prescribed by the State health authorities (with the conference of State health authorities suggested later in the scheme these could soon become uniform in different States). The prescribed methods would be printed on different forms for different diseases. The practitioner would only need to sign one of these and hand it to the householder just as quarantine officers in different ports now hand fumigation orders to captains of vessels that require fumigation.

"3. Carry out the prescribed methods for the prevention of the spread of infection by contacts or carriers — *i.e.*, throat swabs, collection of urinary

and fæcal specimens, etc. At present, some of these are done by nursing or sanitary inspectors. It would be far quicker and more efficient for this to be done by the practitioner seeing and treating the case.

" 4. Examine school-children in particular districts by arrangement with the district health officer and education authorities. Such a provision would chiefly apply to country schools and might occur with regard to a particular threatened epidemic or with regard to physical examination of schools. It would afford opportunity of co-operation of educational and health authorities in special cases.

" 5. Carry out other health duties as prescribed from time to time by regulations or as requested by the district health officer. The objection has been raised that such a proposal puts the practitioner too much under the control of the district health officer. It must be remembered that in the discussion of a general scheme some such clause must be inserted, to leave room for possible developments beyond the instances above cited. The term " requested " as opposed to " prescribed " is used to emphasise the fact that mutual co-operation between district health officer and practitioner is requisite to the scheme, rather than the purely formal carrying-out of legal enactments.

" *Note.* — For all such services rendered the practitioner will receive fees prescribed by regulation. There would thus be an incentive to him to increase his activities : the more interest he showed in preventive measures, the more his remuneration ; part-time medical officers would be abolished ; all men in practice would be on the same level in relation to departmental administration. "

The Director-General of Health of the Commonwealth, giving evidence before a recent Royal Commission on National Health Insurance, after dealing with the above proposals, made the following qualifications :

" All experience shows that modern preventive medicine is ignoring the general medical practitioners to its own disadvantage, and that it is now essential for the success of preventive medicine that all practising physicians should become actively engaged in the official campaign against the occurrence of disease and death. It is, however, necessary that : (1) the practitioner shall not be expected to undertake any duties which are not on the lines of his daily medical work ; (2) the practitioner shall be adequately paid for all work done ; (3) the practitioner shall be prepared to accept freely both advice and direction from trained public health officials on matters outside the range of his own experience or within the range of official necessities ; (4) the practitioner should be prepared to accept discipline in professional matters relating to public health from an official body of his professional colleagues in place of the police-court discipline now provided by various statutes.

" There is one phase of the relationship between the medical practitioner and any administrative organisation which requires consideration. It is an important item in the unwritten code of medical etiquette that a diagnosis declared to a patient by the doctor shall not be questioned in the presence of the patient and shall not be lightly altered even by a senior consultant. While the presumption of infallibility may in the past have been an important adjunct to the doctor's treatment, the general state of public enlightenment renders this now unnecessary, and the attitude of the profession in relation to the sanctity of the original diagnosis as a matter of ethics might well be revised. Another related matter is the practice of some doctors of giving the patient a wide margin of benefit in the issuing of medical certificates for official purposes. It is very desirable that medical certificates of sickness or disability should be more reliable than they now are in many cases. "

These quotations indicate that the Federal Committee of the British Medical Association in Australia is working towards the objective of making the whole army of medical men in the country the fighting force in the public health campaign. This will have, if successful, several good results. It will increase the interest of every medical practitioner in the prevention of disease ; it will compel the public health specialist to supply reliable information, which means that he must know his subject thoroughly ; it will give to the departmental authorities a solid backing of support which will enable them in their turn to compel attention, respect and, most important, funds from Parliament and Government.

Medical Education.

Medical schools exist in connection with the Universities of Sydney, Melbourne and Adelaide. Public health theory and practice is embodied in the curriculum and a course of lectures and field demonstrations with examination are included in the fourth year of the medical course.

A Diploma of Public Health is granted by the Universities of Sydney and Melbourne to graduates who have passed the prescribed examination following a course of a year's study of the theory and practice of public health with work both in the laboratory and the field.

Instructional courses in tropical medicine and hygiene are held at the Australian Institute of Tropical Medicine, Townsville, and are accepted by the Australian universities as covering the practical aspect of the work for the Australian Diploma of Tropical Medicine and Hygiene.

Medical Registration.

The registration of medical practitioners is a State function under the Medical Acts of the several States. Administration is usually effected by a Medical Board which examines the diplomas and qualifications of graduates applying for registration.

Registerable qualifications are approved diplomas from the Australian universities or from approved medical schools of the British Empire, together with prescribed reciprocal qualifications obtained from certain foreign universities.

CHAPTER XIII. HOSPITALS.

As a general rule, in Australia, hospital administration is not in direct relationship to the health authorities. In New South Wales, the Director-General of Health acts independently of the Board of Health as regards the State hospitals and the various public hospitals throughout the State which receive subsidies from the Government. In Western Australia, the government hospitals are under the control of the Commissioner of Public Health. Infectious disease hospitals may be established and maintained by local authorities under the Public Health Acts of the several States. Hospitals for the insane are, excepting in Tasmania, under administration from government departments separate from the health departments. Otherwise, general hospitals are administered by local committees representing contributors with government nominees, whilst a central government department controls the granting of subsidies throughout the State. In New South Wales and in Queensland, certain hospital districts have been created in which all hospitals come under the control of hospital boards constituted of : (1) government nominees ; (ii) representatives of the local authorities of the district ; and (iii) elected representatives of the contributors.

In 1922—the latest year for which complete figures are available—the following summary represents the returns from general hospitals throughout Australia.

Number of institutions	424
Number of beds	18,969
Admissions during year	209,018
Indoor patients healed	218,209
Deaths	13,485
Expenditure	£2,441,075

The following table, taken from the *Official Year-Book of the Commwonwealth of Australia*, No. 17, 1924, p. 504, gives details regarding the number of hospitals, staffs and accommodation for the year 1922 :

GENERAL HOSPITALS — NUMBER, STAFFS AND ACCOMMODATION, 1922.

Particulars.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory.	Total.
Number of hospitals:								
Government	4	—	4	12	22	3	4	49
Other	157	53	93	29	30	12	1	375
Total	161	53	97	41	52	15	5	424
Medical Staff:								
Males	987	96	214	141	62	23	1	1,538
Females ..			9	5	—	—	—	
Total	987	96	223	146	62	23	1	1,538
Nursing Staff and Attendants:								
Males	87	[1] 16	331	97	117	2	5	[1] 655
Females ..	2,519	[1] 921	1,512	746	615	196	10	[1] 6,519
Total	2,606	1,635	1843	843	732	198	15	7,872
Accommodation:								
Number of dormitories, etc. ..	1,132	445	604	292	231	140	8	2,852
Capacity in cubic feet	8,624,728	4,834,155	4,171,919	1,990,486	2,398,576	1,480,000	120,000	23,619,864
Number of beds, etc.	7,382	3,627	3,872	1,578	1,729	736	45	18,969
Cubic feet to each bed	1,168	1,333	1,077	1,261	1,388	2,010	2,667	1,245

[1] Victorian figures, exclusive of 696 nursing staff and two dispensing staff, sexes not available.

PRIVATE HOSPITALS.

The control and supervision of private hospitals is provided for in the Health Acts of the several States. Registration is effected and regular inspections carried out by the medical officer of health of the local authority or by authorised inspectors of the State Health Department. A development of recent years has been the establishment of "intermediate" hospitals, maintained usually by religious connections, which charge fees intermediate between those usually charged by private hospitals, and the nominal payments made by paying patients of the general hospitals.

AMBULANCE SERVICES.

Ambulance services are maintained in each State, usually by semi-private agencies receiving Government subsidies. Such services as those maintained, for example, by the Victorian Civil Ambulance Service and the Queensland Ambulance Transport Brigade provide valuable accessory services to the hospitals, particularly in the more remote country districts. In the far western districts of Queensland, a system of

bush ambulances is maintained by the Presbyterian Church of Australia, and an effort is being made to establish a system of aerial ambulances for urgent and long-distance transport.

CHAPTER XIV. CARE OF THE INSANE.

Excepting Tasmania, provision for the control or hospitalisation of the insane does not come under the administration of the Health Department. In Tasmania, however, the department administers the Mental Deficiency Act, which makes special provision for education and control of deficients, and also exercises control over the Government Mental Hospital.

The provision of hospitals for the insane in Australia is summarised in the following table taken from the *Official Year-Book of the Commonwealth*, No. 17, 1924, p. 511. The figures are for the year 1922.

Number of institutions (exclusive of receiving wards at general hospitals, and including licensed houses for insane in Victoria)	36
Number of beds	18,047
Admissions	3,226
Discharged as recovered, relieved, etc.	1,648
Deaths	1,267
Expenditure	£1,303,907

CHAPTER XV. VITAL STATISTICS.

The collection, compilation and publication of the vital statistics of Australia are not a function of the health authorities. Under the provisions of the Federal Constitution, the item "Census and Statistics" is not allocated exclusively to the Federal Parliament but is one of those matters in connection with which powers may be exercised concurrently by Federal and State Legislatures. In the matter of the Census, the States have ceased to function since the Commonwealth undertook the work, but the right of a State to take a census at any time is not vitiated thereby. In the field of General Statistics, on the other hand, there are now several (seven) bureaux operating. As, however, each State bureau is concerned solely with its own territory and as in many matters the Commonwealth Bureau is largely interested in the presentation of the data for Australia as a whole, there is not a great deal of overlapping or duplication of effort.

The existing organisation in respect of the collection, tabulation, etc., of statistical data as between the State and Federal Statistical Bureau and other government departments to *(a)* Census, *(b)* Vital Statistics and *(c)* Migration may be shown as follows *(Official Year-Book of the Commonwealth*, 1924, p. 1044) :

Subject	Collected by	Tabulated by
(a) Census	Commonwealth Statistician.	Commonwealth Statistician
(b) Vital statistics	State Department (non-statistical)	Commonwealth and State Statisticians.
(c) Migration	Commonwealth Statistician and Commonwealth and State Departments (non-statistical).	Commonwealth Statistician

The registration of births, deaths and marriages is a State function, the Registrar-General or Government Statist being the head of a Department which administers the State Acts relating to *Registration of Births, Deaths and Marriages*, *Notification of Births*, and *Legitimation*, together with certain sections of Acts relating to *Cemeteries*, *Cremation* and *Infant Life Protection.* Each State is divided into registry districts under resident district registrars or assistant district registrars. The duties of the registrar are to inform himself carefully of every birth and death occurring within his district and to register all the prescribed particulars. A conspectus of Acts in force relating to the registration of births, deaths and marriages is contained in the *Official Year-Book of the Commonwealth*, No. 13, 1920, pp. 211 *sqq.* *Australia Demography*, issued annually by the Commonwealth Bureau of Census and Statistics, gives complete data relating to the vital statistics of Australia. Summarised vital statistics are given in each issue of the *Official Year-Book of the Commonwealth*, in which publication there are also given lists of the principal publications issued by the statistical departments of the Commonwealth and the several States.

CHAPTER XVI. THE HISTORY OF THE COMMONWEALTH IN TERMS OF MORTALITY STATISTICS.

The history of Australia offers a fascinating story to the student of any aspect of sociology. In 1788, the " First Fleet " landed its 1,024 souls at Port Jackson, to form an isolated convict settlement. In 1901, the six colonies that had developed in the intervening century federated to form the Commonwealth of Australia — a

self-governing member of the Commonwealth of Nations that constitute the Britis
Empire. To-day a population of 6,000,000 holds a continent of 2,974,581 squar
miles. This population is an English-speaking community that has practically dis
placed the scattered tribes of primitive aborigines that alone inhabited the territor
of 137 years ago. The whole story of settlement and of economic and social develop
ment therefore covers a period that is but recent history. The reaction of this Bri
tish community to its new environment and the working-out of its destinies toward
young nationhood are all expressed in the story of the public health. Throug
successive phases of exploration, settlement and stabilisation of the population
during a period for the whole of which the recorded history is available, there can b
traced an evolution of disease that is not paralleled in the epidemiological histor
of any other country.

The history of Australia may be said to represent four quite distinct phases o
settlement that cover periods not concurrent but yet analogous in each State. I
Western Australia, for example, each phase has lagged some thirty years behind tha
of the earlier-settled Eastern States, yet the story is the same, albeit more condense
A. W. Jose, an Australian historian, has termed these four phases : (1) Convictism
(2) Squatterdom ; (3) Diggerdom ; and (4) Australia of To-day. The nomenclature i
Australian and needs interpretation, and that interpretation can be expressed in term
of the public health.

The first phase represents an isolated convict settlement on the shores of a vas
and unexplored island continent. The small community was wholly dependent o
the outside world for all supplies, stores and provisions. The long sea voyage fro
England occupied from five to eight months. The story of disease was therefo
almost entirely dietetic. Scurvy, diarrhœas and dysenteries were constantly presen
with occasional outbreaks that coincided in many instances with delayed arrival o
supply ships. Ophthalmia was rife and may have been of a dietetic, infective or clima
tic source, or possibly a combination of all three.

The second phase saw the gradual extension of settlement, the advent of fre
labour and the decline of transportation of convicts. The settlements produced the
own produce, cattle and sheep were introduced, and the pastoral history of Austral
may be said to have commenced. The "squatters" established farms and shee
and cattle stations, rapidly following in the wake of intrepid explorers. The settl
ments were still isolated, but townships sprang up, and by 1841 the population o
Sydney was 30,000. Generally, the public health was good, supplies were plentif
and the climate congenial to the robust type of young migrant who came to t
country. Medical records of this period are scanty, but such as do exist indicate t
occasional occurrence of the infectious diseases — probably typhoid fever and t
exanthemata which when introduced did not spread and quickly died out. The isol
tion of the settlements was probably the factor responsible for the lack of propagati
of the infection in these instances.

The third phase saw the great development of the mid-century, the influx
settlers that commenced in 1848 and the gold rushes that followed the first discove

of gold in1851. Overcrowding was developing in the towns, the sanitary conditions of both towns and gold " diggings " were primitive, and the flood of immigration continued to pour in people from all parts of the world. The population was largely made up of robust adult males who were followed in time by their womenfolk, so that the population in the early part of the period between 1848 and 1875 was largely constituted of young adults with few children or older people. Towards the end of this period the natural result of the young adult population was a high birth rate and an increasing proportion of infants and adolescents in the population. The health picture of the community represented the conditions that existed. The man-made faults of environment and the influx of new arrivals resulted in outbreaks of virulent typhoid fever (the " colonial fever " fo those days) and dysentery. The growth of a susceptible young population produced extensive and severe outbreaks of the exanthemata, and the infant mortality from diarrhœa and from dietetic causes was abnormally high.

The story since 1875 is that of continued development, of pastoral and industrial activity, and of social and economic experiments that have resulted in a high standard of living and wages for all classes. In this period there has occurred a stabilisation of the population, till, in the mass, the present age and sex distribution of the community is more or less comparable with that of the standard populations that are accepted as statistically representative of the constitution of populations of European stock in other countries. The early years of this period saw much overcrowding in the cities, which lacked, however, the huge " slum " aggregations of population that exist in older countries. Sanitation remainded at a low ebb for many years. Still, the fifty years that cover this period have shown a steady trend of economic and social advancement. In few countries has social legislation been so advanced ; in no country has there been such continued and general prosperity as reflected in the standard of living and of education attained by all classes. It has been said that the public health of a country is but an index of the economic status of the community expressed in terms of vital statistics rather than in *per capita* values of revenue and commerce. The vital statistics of Australia provide much food for thought for the economist and the sociologist ; whilst for the epidemiologist there is presented a study of the evolution of disease that represents a progression that has probably occupied centuries in countries of the Old World.

The following data (Table 1) are brought together as an indication of this movement in Victoria as a representative Australian State. Table 2 presents certain records of Australian vital statistics in comparison with those of some oversea countries at the present time.

Table 1.

Certain Rates of Vital Statistics of Victoria, arranged in Quinquennial Periods, 1861-1920.

Population at each Decennial Census.	Quinquennial Periods.	Crude Death Rate per 1,000 of Population.	Crude Birth Rate per 1,000 of Population.	Infantile Mortality: Deaths under one year per 1,000 births.	Deaths from Typhoid Fever per 1,000 of Population.	Deaths from Pulmonary Tuberculosis per 1,000 of Population.	Deaths from Cancer per 1,000 of Population.
1861 : 538,628 . .	1861-1865	17.36	43.30	[1]	5.65	12.68	1.96
	1866-1870	16.52	39.27	129.54	6.19	12.28	2.43
1871 : 730,198 . .	1871-1875	15.64	35.69	124.53	4.71	12.02	3.26
	1876-1880	14.92	31.43	119.87	5.29	13.13	4.16
1881 : 861,566 . .	1881-1885	14.65	30.76	121.51	5.18	14.10	4.53
	1886-1890	16,07	32.72	131.06	6.09	14.55	5.32
1891 : 1,139,840 . .	1891-1895	14.04	30.93	111.81	2.69	13.26	6.19
	1896-1900	13.72	26.22	111.29	2.90	11.89	6.89
1901 : 1,201,070 . .	1901-1905	12.74	25.05	96.82	1.57	11.16	7.53
	1906-1910	12.01	25.12	79.96	1.12	9.16	7.96
1911 : 1,315,551 . .	1911-1915	11.51	25.44	72.15	0.69	7.56	8.44
1921 : 1,531,280 . .	1916-1920	11.38	23.04	66.96	0.37	7.04	9.13

[1] Data incomplete.

Table 2.

CERTAIN RATES OF AUSTRALIAN VITAL STATISTICS, WITH COMPARATIVE DATA FOR SOME OVERSEA COUNTRIES.

Country.	Year for which Data are shown.	Crude Death Rate per 1,000 Population.	Infantile Mortality (Deaths under one year per 1,000 Births).	Deaths from Typhoid Fever per 100,000 Population.	Deaths from Pulmonary Tuberculosis per 100,000 Population.	Deaths from Cancer per 100,000 Population.
New South Wales	1924	9.35	58.93	4.35	51	93
Victoria	1924	10.05	61.32	2.01	57	101
Queensland	1924	8.88	51.30	5.57	37	79
South Australia	1924	9.19	51.33	2.64	63	97
Western Australia	1924	9.08	49.87	5.56	62	90
Tasmania	1924	9.89	54.99	3.73	60	92
COMMONWEALTH	1924	9.47	57.08	3.77	53	93
New Zealand	1924	8.29	40.23	1.8[1]	44	96
England and Wales	1923	10.9	69	1.2	84	127
Scotland	1923	12.9	79	1.0	82	130
Irish Free State	1923	13.3	66.4	4.5	111	86
United States of America (Registration Area)	1923	11.9	77.7	6.8	82	89
Canada (excluding Quebec)	1924	9.8	79	6.0[2]	55	82
Union of South Africa (White)	1923	9.8	74.42	2.3	35	71

[1] 1923. [2] 1922. (Data by courtesy of the Commonwealth Statistician.)

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Health Organisation

Cerebro-spinal Meningitis in Prussia in 1923 and 1924

THIRD (AND FINAL) REPORT

by

Professor Dr. E. SELIGMANN (Berlin)

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CEREBRO-SPINAL MENINGITIS IN PRUSSIA

IN 1923 AND 1924

Third (and Final) Report[1]

PREFACE.

In the years covered by the present report the population of Prussia amounted to slightly over 38 millions. In accordance with the Prussian Statistical Office, 867 cases of infectious cerebro-spinal meningitis with 481 deaths were reported in 1923, and 525 cases with 297 deaths in 1924. Partly through the reports of the competent medical officers and partly as the result of our own enquiries, we obtained particulars regarding 756 cases in 1923 and 465 cases in 1924. These figures include the cases discussed in the previous reports regarding Berlin.

In the present report, the figures for each of the two years under discussion are first of all given separately, and the clinical, bacteriological and epidemiological details in connection with these figures are then discussed. Since we are dealing here with general questions, and the actual amount of statistical material available is therefore not without importance, the report has been based on the combined statistics for the years 1923 and 1924.

[1] The first two preliminary reports were printed in *Monthly Epidemiological Reports* Nos. 71 and 77.

I. STATISTICS FOR 1923.

1. Morbidity.

The total number of cases reported by the district medical officers (*Kreisärzte*) was 756. This number was made up of:

(*a*) Cases which could not be verified either because the name of the attending physician could not be ascertained or because no information was available, or the case-sheets, notes, etc., were missing, etc., 216;

(*b*) Cases erroneously reported (*not* meningitis), 20;

(*c*) Cases of meningococcal meningitis (bacteriologically proved), 371;

(*d*) Cases of meningitis of undetermined ætiology either because the cerebrospinal fluid was not investigated or because the bacteriological examination gave no results, 111;

(*e*) Cases of meningitis of a demonstrably different ætiology, 38.

The following details may be noted:

(*a*) Since the enquiry was only instituted in 1924, there was some difficulty in ascertaining the number of cases which had occurred in the previous year. Sometimes the attending physicians could no longer be traced or they were no longer able to give reliable information. Many of the smaller hospitals and trades-union dispensaries either did not keep case-sheets or no longer had them available. The mere statement that cases were "certain meningitis" was not sufficient for our purpose, since no ætiological indications were given. We have therefore reported all these cases as of "doubtful ætiology", although we are convinced that among this number there must be a great many genuine cases of meningococcal meningitis.

(*b*) Further enquiries regarding these cases showed that a number of them had been erroneously reported. Four cases were reported to have been erroneously notified and not to have been meningitis at all; two were cases of tetanus, one of poliomyelitis, one of encephalitis, one of cerebral abscess and one of influenza. The diagnoses in the other ten cases varied so much that some confusion on the part of the reporting authorities must be assumed.

(*c*) In these cases the ætiology was determined by bacteriological examination, almost in every case by making cultures of the bacilli obtained from lumbar punctures. In one case staphylococcus aureus, in another micrococcus catarrhalis, and in a third tuberculosis bacilli were found *in addition* to meningococci.

Details regarding cultures of meningococci taken from the blood, from pus in cases of simultaneous otitis media purulenta, and from secretions in the case of inflammation of the wedge-bone cavity, were given once in each case. Two persons had the disease twice and each case was reported twice. In our survey, however, they have been counted as only one for each.

(*d*) Among the cases the ætiology of which could not be determined a great many were undoubtedly genuine meningococcal meningitis. Both the clinical picture and the epidemiology of the cases would seem to prove this. In some cases the doctor was only summoned in the last stage, when the patient was already moribund. In other cases, the lumbar punctures were made only once or twice. Under these circumstances the negative results are no proof against the meningococcal ætiology of the case; we know from the experiences mentioned under (*c*) that meningococci could often only be isolated after four or five lumbar punctures had been made. Isolated cases were treated without tapping the cerebro-spinal fluid.

(*e*) Meningitis caused by organisms other than meningococci was diagnosed in 38 cases; among these organisms the following were found:

1. Pneumococci	13
2. Hæmolytic streptococci. . .	3
3. Streptococcus viridans . . .	2
4. Micrococcus catarrhalis . . .	4
5. Influenza bacilli	1
6. Coli bacilli	1
7. Typhoid fever bacilli .	1
8. Tuberculosis bacilli	13

The total of the figures given shows that, of the 756 *cases of infectious cerebro-spinal meningitis reported by the district medical officers,* 540 *could be thoroughly investigated;* 58 *of these* (10.7 *per cent) were not meningococcal meningitis; in* 111 (20.6 *per cent) cases the ætiology could not be determined; and in* 371 (68.7 *per cent) the presence of meningococci was bacteriologically proved.*

2. Mortality.

Of the 371 reported cases of *meningococcal meningitis*, 210 proved fatal. In 6 cases the issue of the disease was not certain and could not subsequently be ascertained. If these 6 cases are deducted, the *case fatality* of meningococcal meningitis amounts to 57.5 per cent.

Of the 111 cases of meningitis of *doubtful ætiology*, 64 proved fatal; in 2 cases the issue of the disease could not be ascertained. Allowing for these facts, the case fatality of this *group of meningitis cases* is reckoned at 58.7 per cent. This correspondence between the case fatality figures bears out our assumption that the cases in this group were also mainly due to meningococcal infection.

Of the 38 cases of meningitis of a *different ætiology*, 29 were fatal and in 3 the issue could not be determined. The case fatality for this group amounts to 82.9 per cent. The fact that the tuberculous forms of meningitis are invariably fatal partly accounts for this high figure.

3. Monthly Distribution of Cases.

In the following tables the notifications are entered according to months. The first column shows the cases of meningococcal meningitis, the second those of meningitis of doubtful ætiology, and the third column sums up the two preceding ones on the justified assumption that both these columns on the whole represent genuine cases of infectious cerebro-spinal meningitis. The cases of a definitely different ætiology have been omitted.

Month	Meningitis		Total
	Meningococcal	Ætiology doubtful	
January	42	14	56
February	36	9	45
March	60	12	72
April	40	10	50
May	31	17	48
June	43	7	50
July	31	7	38
August	28	10	38
September	16	8	24
October	11	7	18
November	14	4	18
December	13	4	17
No indication as to month	6	2	8
Total	371	111	482

According to this table, the incidence of the disease is highest in the first half of the year; it decreases about the middle of the year and is lowest in the autumn and winter months. The March figures are the highest and those for December the lowest.

4. Distribution according to Age and Sex.

In this table also there are separate columns for two groups of meningitis and one combining both groups. The figures in parentheses represent deaths.

Age	Meningitis				Total for each Group		Grand Total
	Meningococcal		Ætiology doubtful				
	Male	Female	Male	Female	Male	Female	
Under 1 year	30 (26)	16 (11)	3 (3)	5 (4)	33 (29)	21 (15)	54 (44)
1-2 years . .	24 (14)	10 (6)	10 (7)	3 (2)	34 (21)	13 (8)	47 (29)
3-5 ,, . . .	15 (10)	13 (8)	3 (3)	3 (2)	18 (13)	16 (10)	34 (23)
6-10 ,, . . .	21 (11)	14 (4)	5 (3)	4 (2)	26 (14)	18 (6)	44 (20)
11-20 ,, . . .	85 (37)	35 (17)	28 (15)	12 (5)	113 (52)	47 (22)	160 (74)
21-30 ,, . . .	40 (24)	11 (2)	14 (5)	4 (2)	54 (29)	15 (4)	69 (33)
Over 30 years	25 (21)	12 (8)	7 (4)	1 (–)	32 (25)	13 (8)	45 (33)
No indication as to age or sex	20 (11)		9 (7)		29 (18)		29 (18)
Total. .	20 (11)		9 (7)		29 (18)		
	240 (143)	111 (56)	70 (40)	32 (17)	310 (183)	143 (73)	482 (274)

This table shows:

1. That this disease is much more frequent in men than in women. 68.4 per cent of the cases occurred among boys and men; 31.6 per cent among girls and women (the 29 cases without indications as to sex have not been counted). The preponderant liability of the male sex to this disease is to be found in all the age groups; it is almost as marked in the cases of meningitis doubtful of ætiology as in those of proved meningococcal meningitis.

2. The case fatality among men is 59 per cent and among women 51 per cent. These figures correspond in both groups of meningitis cases.

3. Out of 453 cases, only 114 were those of adults over 20 years of age; even when meningitis is only sporadic it appears to attack principally children. 74.8 per cent of the cases were young persons under 20 years of age. Nearly 12 per cent of the cases were infants. The age groups of from 0 to 5 years make up 29.8 per cent of the total morbidity figures.

4. The case fatality is highest in infancy, amounting to 81.5 per cent. It gradually decreases in the subsequent age groups, is lowest between 6 and 10 years of age, *i.e.*, 45.5 per cent, and again increases in the higher age groups, *i.e.*, 73.3 per cent over 30 years of age. In this respect also the two forms of meningitis show the same characteristics throughout.

A comparison of these figures with those for 1924 will show whether these data are of general significance or whether they are peculiar to the year 1923.

5. Distribution according to Occupation.

The occupation shown in the tables refers either to the patient himself or, in the case of children or women without occupation, to that of the head of the family. These data are unfortunately not as complete as might be wished. In a great number of cases no indication was given as to trade or profession.

Occupation	Meningococcal	Ætiology doubtful	Total
No indication	109	37	146
Miners	68	26	94
Industrial workers	44	21	65
Merchants	30	4	34
Agriculturists	18	5	23
Students	3	4	7
Officials	8	1	9
Fitters	5	—	5
Masons	5	1	6
Bakers	4	1	5
Butchers	3	—	3
Smiths and Locksmiths	26	2	28
Carpenters and Cabinetmakers	8	—	8
Coachmen	4	1	5
Chauffeurs	—	1	1
Tailors	3	1	4
Moulders	1	—	1
Painters	2	—	2
Hairdressers	1	—	1
Engine-drivers	1	—	1
Waiters	1	—	1
Bridge-builders	—	—	1
Laundresses	—	1	1
Domestic Servants	4	3	7
Soldiers	3	—	3
Sailors	2	—	2
Boatmen	1	—	1
Unemployed	5	—	5
Pupils in boarding-schools	9	1	10
Orphans	2	—	2
Prisoners	1	111	482
Total	371	111	482

The number of miners in this list appears to be remarkably high; these miners are invariably underground workers in coal-mines. Moreover, among the cases where no indication as to occupation was given there were a great number of persons living in mining districts, and a great many of the cases of meningitis which could not be properly investigated occurred in these very districts. In 21 cases "miner" was explicitly mentioned as the occupation. There is no doubt, therefore, that a large proportion of cases occurs among the mining population. We will revert to this subject in another connection when discussing the local distribution of meningitis.

6. Financial Situation.

The particulars regarding the financial situation of the patients and their families were taken from the notes of the attending physicians, who frequently indicate it by figure (I = good; II = adequate; III = unfavourable). The following table sums up the results of the enquiries made in this connection:

	Meningitis		Total
	Meningo-coccal	Ætiology doubtful	
Good	44	9	53
Adequate	178	62	240
Unfavourable	50	16	66
No indication	99	24	123
Total	371	111	482

These figures show that, in so far as information was available, the overwhelming majority of cases occurred among persons in easy circumstances; rather less than one-fifth of the cases investigated occurred among persons living in a state of poverty.

The results of further enquiries we have made regarding housing conditions confirm what has been said about the financial situation of the patients. Although, in view of the general housing shortage — which is still very acute — the results of this investigation must be accepted with some reserve, they may nevertheless be regarded as complementary to the information collected regarding the financial situation alone.

Housing Conditions	Meningitis: Meningo-coccal	Meningitis: Ætiology doubtful	Total
No information	267	74	341
Maximum per room:			
13 persons	0	1	1
6 persons	1	2	3
5 persons	0	4	4
4 persons	6	0	6
3 persons	14	5	19
2 persons	42	14	56
1 person	25	10	35
Children's homes	8	0	8
Boarding-schools	2	0	2
Institutions	1	1	2
Barracks	1	0	1
Ships	3	0	3
Prison	1	0	1
Total	371	111	482

The fact that it has been impossible to obtain particulars in such a large number of cases somewhat detracts from the reliability of the conclusions to be drawn from this table. Nevertheless the figures show that in the majority of cases the housing conditions also were not particularly unfavourable, at any rate in so far as crowding was concerned. In some cases, damp, dark or dirty lodgings are specially mentioned.

7. Hospital Treatment.

Of the 371 meningococcal meningitis patients, 342 (92.2 per cent) were taken to hospital and treated there. Of the 111 cases of doubtful ætiology, 77 (69.4 per cent) were admitted to hospital.

8. Bacteriological Examination of Contacts.

Data regarding the results of the bacteriological examination of those persons in contact with patients are very meagre. In the majority of cases the special column for these particulars has not been filled in. We therefore give the figures without further comment.

Result of Examination	Meningitis: Meningo-coccal	Meningitis: Ætiology doubtful	Total
Presence of meningococci proved	6	0	6
Presence of meningococci not proved . .	25	7	32
No information	340	104	444
Total	371	111	482

II. STATISTICS FOR 1924.

The data obtained for 1924 are much fuller than those collected for the previous year. We were able in every case to make the necessary enquiries immediately after notification; moreover, as from May 1st, 1924, in accordance with the Decree of the Prussian Ministry for Public Welfare, each case was immediately investigated by the district medical officers. The questionnaires duly filled in were then forwarded to us. An occasional enquiry in the hospitals or from the district medical officers was all that was necessary to gain an idea of the subsequent course and the issue of the illness. For this reason, the number of doubtful cases and of cases regarding which detailed information was not available is much smaller in comparison with the previous year.

1. Morbidity.

The total number of cases reported by the district medical officers was 465.

Of these the following were:

(*a*) Doubtful, either because the name of the attending physician could not be ascertained or because particulars could not be obtained, or case-sheets, notes, etc., were missing, 52;

(*b*) Erroneously reported (*not* meningitis), 4;

(*c*) Meningococcal meningitis (bacteriologically proved), 303;

(*d*) Meningitis of doubtful ætiology, either because the fluid was not examined or the bacteriological examination gave no results, 91;

(*e*) Meningitis proved to be of different ætiology, 15.

It should be noted in regard to:

(*b*) That one was a case of puerperal sepsis, one of encephalitis lethargica, one of dysentery, one of influenza with suppurative inflammation of the frontal cavity;

(*c*) That in five cases the serum reaction of the patients confirmed the meningococcal ætiology, that in two cases it was alone decisive, and that the agglutination titre fluctuated between 1:25 and 1:400. In one case, cultures of meningococci were made from the blood, in another from pus taken from an inflamed jaw cavity. In three cases hæmolytic streptococci were found in the spinal fluid, in two cases influenza bacilli, and in one case tuberculosis bacilli in addition to meningococci.

(*d*) The explanations given in respect of 1923 apply equally.

(*e*) Meningitis caused by bacilli other than meningococci was diagnosed in 15 cases. The organisms found were:

	Cases [1]
Pneumococci	7
Staphylococci	1
Grampositive diplococci	1
Tuberculosis bacilli	6

The preceding figures show that, of the 465 *cases reported by district medical officers,* 413 *could be closely investigated. In* 19 *of these cases* (4.6 *per cent*) *the disease was not meningococcal meningitis, in* 91 (22 *per cent*) *the ætiology was doubtful and in* 303 (73.4 *per cent*) *bacteriological evidence of meningococcal infection was obtained.*

The figures are approximately the same as those for the previous year, except that the number of cases incorrectly reported is considerably smaller and therefore the number of genuine cases of meningitis relatively larger.

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[1] Once together with streptococci and staphylococci.

2. Mortality.

Of the 303 cases of *meningococcal meningitis*, 181 proved fatal, the case mortality thus being 59.7 per cent. In the previous year the case mortality had been 57.5 per cent.

Of the 91 cases of *meningitis where the ætiology was doubtful*, 65 proved fatal, the case mortality being therefore 71.4 per cent (in the previous year it had been 58.7 per cent).

Of the 15 cases of a *different ætiology*, 13 of the patients died. The *case mortality* thus amounted to 86.7 per cent (in the previous year it was 82.9 per cent).

It will be seen from these figures that, though the incidence of the disease was smaller in 1924 than in the previous year, the death rate was higher. In view, however, of the relatively large number of uninvestigated cases in 1923, this conclusion cannot be regarded as absolutely reliable.

3. Monthly Distribution of Cases.

Month	Meningitis		Total
	Meningo-coccal	Ætiology doubtful	
January	35	4	39
February	39	8	47
March	28	11	39
April	27	7	34
May	40	12	52
June	31	8	39
July	21	7	28
August	19	10	29
September	13	7	20
October	11	9	20
November	19	3	22
December	20	5	25
No indication as to month	—	—	—
Total	303	91	394

The monthly distribution does not vary a great deal; it shows, nevertheless, that the incidence is somewhat greater in the first half-year than in the second. It is at its lowest in September and October and at its highest in May.

4. Distribution according to Age and Sex.

(The numbers in parentheses indicate deaths.)

Age	Meningitis				Total for each Group		Grand Total
	Meningococcal.		Doubtful Ætiology				
	Male	Female	Male	Female	Male	Female	
Under 1 year	30 (25)	14 (11)	3 (1)	6 (4)	33 (26)	20 (15)	53 (41)
1-2 years . .	25 (17)	18 (12)	8 (6)	4 (4)	33 (23)	22 (16)	55 (39)
3-5 ,, . .	18 (8)	7 (3)	4 (4)	1 (1)	22 (12)	8 (4)	30 (16)
6-10 ,, . .	12 (6)	10 (5)	6 (4)	3 (1)	18 (10)	13 (6)	31 (16)
11-20 ,, . .	52 (25)	26 (14)	17 (11)	8 (6)	69 (36)	34 (20)	103 (56)
21-30 ,, . .	32 (15)	15 (11)	14 (10)	4 (3)	46 (25)	19 (14)	65 (39)
Over 30 years	26 (18)	16 (10)	9 (7)	3 (2)	35 (25)	19 (12)	54 (37)
No indication as to age or sex	2 (1)		1 (1)		3 (2)		3 (2)
Total .	195 (114)	106 (66)	61 (43)	29 (21)	256 (157)	135 (87)	394 (246)
	2 (1)		1 (1)		3 (2)		

These figures, considered from the same points of view as those for 1923, show:

1. That the number of cases is again considerably higher among males than among females. The proportion of male patients is 65.6 per cent, as against 34.5 per cent females (the figures for the previous year were 68.4 and 31.6 per cent respectively). This higher proportion of males is found in both forms of meningitis and in all age groups, and *there can therefore be no doubt that this is a regular feature of the disease.*

2. The case mortality amounts to 61.3 per cent for males and 64.4 per cent for females. Here the position is the reverse of what it was in the previous year, when the case mortality of males (59 per cent) was higher than that of females (51 per cent).

The differences between case mortality among males and females are thus comparatively small and *no* basic difference can be inferred from them.

3. Of the 391 patients, 119 were over 20 years of age and 272 were under 20 (69.5 per cent, as compared with 74.8 per cent in the previous year). Here, too, we find the largest number of cases among the young. The proportion of infants is 13.5 per cent, and of the age group 0-5 years, 35.3 per cent, of the total morbidity. *These figures approximate very nearly to those for the previous year* (12 *per cent and* 29.8 *per cent respectively*), *and may therefore be accepted as typical.*

4. The case mortality of the various age groups also corresponds to that of the previous year, that is to say it is at its highest (77.4 per cent) among infants (as compared with 81.5 per cent in the previous year); there is a gradual diminution in the next age groups, the minimum (51.6 per cent) being reached in children of 6-10 years (45.5 per cent in the previous year). The incidence then increases with age. *These facts also may therefore be regarded as of universal significance.*

5. Distribution according to Occupation.

In this year also the information regarding the occupation of patients was very incomplete.

Occupation	Meningitis Meningo-coccal	Meningitis Ætiology doubtful	Total
No indication	139	48	187
Miners	37	9	46
Industrial workers	30	3	33
Artisans	22	5	27
Tradesmen	13	—	13
Officials	19	—	19
Agriculturists	5	6	11
Students	3	—	3
Domestic Servants	9	2	11
Soldiers	4	—	4
Policemen	1	1	2
Stokers and Firemen	3	1	4
Weavers	4	—	4
Bakers	2	3	5
Coachmen	1	1	2
Butchers	—	1	1
Chauffeurs	2	—	2
Waiters	2	—	2
Innkeepers	—	1	1
Barbers	1	—	1
Fishermen	1	—	1
Shepherds	1	—	1
Orphans	1	2	3
Prostitutes	—	1	1
Unemployed	2	6	8
Prisoners	1	1	2
Total	303	91	394

The disease is again found to be commonest among miners. Once again, too, a considerable number of infected persons whose occupation was not given lived in mining districts. Moreover, in many of the cases where the nature of the disease could not definitely be established the patients were miners.

6. Financial Situation.

Financial position	Meningitis Meningo-coccal	Meningitis Ætiology doubtful	Total
Good	50	11	61
Adequate	181	45	226
Unfavourable	25	16	41
No information	47	19	66
Total	303	91	394

The figures obtained correspond in every respect to those of the previous year. The large majority of patients belonged to the well-to-do classes, only a small number of cases occurring among persons in poor circumstances.

The facts regarding housing conditions are as follows:

Housing Conditions	Meningitis Meningo-coccal	Meningitis Ætiology doubtful	Total
No information	92	23	115
Maximum per room:			
7 persons	1	1	2
6 ,,	1	1	2
5 ,,	5	1	6
4 ,,	14	5	19
3 ,,	36	13	49
2 ,,	85	23	108
1 ,,	55	20	75
Children's homes	6	2	8
Barracks	4	1	5
Clinics	1	—	1
Monasteries	1	—	1
Prisons	1	1	2
Hostels	1	—	1
Total	303	91	394

The table shows that in most of the cases investigated even from the point of view of housing the patient was in fairly easy circumstances. *Thus the reports for*

both years show that there is no reason to believe that the disease is more prevalent among those sections of the population whose living and housing conditions are specially unfavourable.

7. Hospital Treatment.

Of 303 cases of meningococcal meningitis, 275 (90.8 per cent) were admitted to hospital, and of 91 cases of meningitis of doubtful ætiology 55 were taken to hospital and 33 were not. In the other three it could not be definitely ascertained whether the patient was taken to hospital or not. The percentage of cases admitted to hospital is thus 62.5. These figures are approximately the same as those for the previous year and show that the large majority of patients received hospital treatment.

8. Bacteriological Examination of Contacts.

In this year also very few such tests could be carried out or verified. It is impossible to say how far tests were made at the time or subsequently in cases regarding which no information was available.

Results of Test	Meningitis Meningococcal	Meningitis Ætiology doubtful	Total
Meningococci found . . .	8	2	10
Meningococci not found. .	88	20	108
Results not given	207	69	276
Total	303	91	394

Local Distribution of Cases of Meningitis in Prussia in 1923 *and* 1924.

The table on pages 42 and 43 shows the total number of cases of meningitis reported in both years. The calculation of cases per 100,000 inhabitants refers to the total number of cases reported. The subdivision according to ætiology makes it possible to form an idea of the position in individual districts. The heading "Different Ætiology" includes also cases incorrectly reported.

The average morbidity in Prussia amounted in 1923 to 1.98 and in 1924 to 1.22 per 100,000 inhabitants.

The figure was *above* the average in both years in:

Upper Silesia	6.37 and 1.90
Westphalia	5.21 and 3.56
Rhine Province	2.31 and 1.35

and in one year:

Berlin	—	1.48

With the exception of Berlin, the provinces in which most cases occurred were mainly coal-mining areas with extensive mines, such as the Ruhr Territory and its immediate surroundings in the west, and in the south-east the mining districts of Upper Silesia. In the non-mining areas of Coblenz and Cologne (Rhine Province) the figures are below the general average, whereas Aix-la-Chapelle and Dusseldorf, which are pre-eminently mining areas, are far above the average for the whole Rhine Province (4.35 and 1.59, and 3.01 and 1.52 respectively). The only high average besides that of the coal-mining areas is found in the capital, Berlin.

If the individual provinces are subdivided into districts (*Kreise*), it will be found that the largest number of cases occur in those districts which are recognised mining centres. It is these districts which are responsible for the abnormally high morbidity figures in their respective provinces. There can be no doubt, therefore, that the disease shows a distinct preference for mining districts.

III. SUMMARY OF RESULTS OF STATISTICAL INFORMATION.

No epidemic outbreak occurred in either of the years covered by the enquiry. As compared with the previous years they show a decrease in the incidence of the disease, particularly in 1924. The morbidity figures (1.98 and 1.22 per 100,000 inhabitants respectively) must be regarded as very low. In the period under consideration, therefore, meningitis appeared almost entirely in so-called *sporadic* form.

1. Of the cases which were more closely investigated about 70 per cent were proved to have been due to meningococci.

2. In about 21 per cent of the cases the ætiology was doubtful, as bacteriological tests were either not made or gave no results. On epidemiological and clinical grounds,

however, the large majority of these cases must also be regarded as meningococcal meningitis.

3. In 1923, 10.7 per cent, and in 1924, 4.6 per cent of the cases reported were not infectious cerebro-spinal meningitis; in some the ætiology was different, while others were wrongly reported.

4. The morbidity was greater among males than among females. In both years about two-thirds of the patients were male and one-third female.

5. About 72 per cent of the patients were children or adolescents, and about one-third were children under 5 years of age. The proportion of infants was 12 to 13 per cent.

6. The majority of cases occurred in the first half of the year.

7. As regards the occupation of the patients (or, in the case of children, that of the father), a remarkably high proportion were miners.

8. As regards the local distribution of cases in Prussia, the disease showed a distinct preference for the mining provinces. Apart from these, Berlin was the only place where a considerable number of cases occurred.

9. The majority of cases occurred among persons in easy circumstances living under favourable housing conditions.

10. About 86 per cent of the patients received hospital treatment.

11. The case fatality in 1923 amounted to 57.8 per cent and in 1924 to 62.4 per cent. Among infants it exceeded 80 per cent.

12. It was not possible to carry out on a large scale the bacteriological examination of the surroundings of the patient, and where this was done positive results were rarely obtained.

IV. CLINICAL AND EPIDEMIOLOGICAL DATA.

1. Sources of Infection.

It is obvious that, where cases of meningitis only occur sporadically, the *source of infection* can hardly ever be satisfactorily determined, and this was the case in the present enquiry. Most of the replies simply say "Source of infection unknown". In a number of cases the doctor specifically states: "The only case in the whole locality", or: "No similar case known for years". Another circumstance which leaves

the source of infection a mystery is that isolated cases often occur in some closed institution such as a monastery, boarding-school, orphanage, barracks or warship.

Fuller details as to the source of the infection — and these were sometimes pure conjecture — were only given in 37 cases out of all the cases of meningitis, both meningococcal and of doubtful ætiology, reported in 1923 and 1924. In three of the cases infection was attributed to the material used by the victim in his work, to manufactured wool and to hides of Russian origin, but no sound reason for this assumption was given. In one case the disease was believed to have been introduced from Poland. In four others it was supposed that the outbreak was connected with previous cases, namely:

1. The father of the sick child had died of otitis media purulenta two months previously.

2. The mother of a sick infant had been attacked fourteen days previously by pharyngitis, accompanied by severe headache and fever; she had been suckling the child.

3. The father and the brother and sister of the sick child had a week previously been generally unwell with severe headache and had been obliged to stay in bed.

4. A two-year-old child was living in quarters provided for harvest workers, many of whom were in bed there with influenza and colds.

It is not impossible that in the first three cases the disease supposed to be responsible for the infection was really abortive or masked meningitis. We have already obtained a considerable amount of epidemiological evidence showing that such slight and often undiscovered forms of disease do exist. The various forms of otitis, and also pharyngitis, are complications usually accompanying meningitis.

In two cases responsibility for infection was attributed to a gang of miners among whom meningitis had occurred. In three other cases infection was said to have been caused by persons who had been in contact with other cases of meningitis. In eighteen cases the disease was supposed to have been spread by direct infection from other meningitis patients [1], once through having gone to see the body of a child who had just died of meningitis. In the following cases the data are more fully substantiated:

[1] In thirteen of these cases more than one member of the same family was attacked, and it is not always certain whether one member of the family caught it from another or whether both were infected from the same source (see also following chapter).

1. A lodger in the same household had been taken ill with meningitis two days previously.

2. In a case which occurred in East Prussia the infection was carried by a child from the Ruhr district who was staying there during convalescence and in whose family an outbreak of meningitis had previously occurred.

3. The parents of the infant lived in barracks in which an outbreak of meningitis had occurred fourteen days previously.

4. Nine months before the outbreak in question meningitis had occurred in the same house; one of the inmates was still a germ-carrier.

5. The husband was found to be the carrier of the disease.

The last case is not conclusive, as it was not certain that the meningococci had not been transmitted from the sick wife to him. The other cases, however, appear conclusive and point to the importance of healthy germ-carriers from the epidemiological point of view.

2. Infection of more than one Member of a Family.

On thirteen occasions more than one member of a family was infected, and in three cases two brothers or sisters were taken ill on the same day. In these cases infection from the same source may be assumed.

In the following cases members of the same family were infected within a few days of each other:

1. Boy, 15 years old, taken ill 16.4.23, and his younger brother 17.4.23.

2. Man, 30 years old, taken ill 4.5.24 and his mother, 56 years old, 6.5.24.

3. Boy, 3 years old, taken ill 13.5.24; his sister, 9 months old, 16.5.24.

4. Boy, 3 years old, taken ill 8.3.24; his sister, 1$^{1}/_{2}$ year old, 12.3.24.

5. Boy, 7 years old, taken ill 23.5.24; his sister, 1 year and 9 months old. 28.5.24.

6. Girl, 1 year old, taken ill 28.7.24; her father, 26 years old, 2.8.24.

7. Female child taken ill 2.3.23; sister, 11 years old, 10.3.24; brother, 15.3.23,

8. Two sisters, 3 and 10 years old, taken ill within a few days of each other (no further details).

In these cases it is probable that one member of the family caught the infection from another, although it is just possible that some of them were infected from a common source, but that the period of incubation was longer in some instances than in others.

Two cases were observed of fresh infection in the same family after a comparatively long interval, namely,

1. Girl, 10 years old, taken ill 7.2.23; taken to hospital 10.2.23; sister, 4 years old, taken ill 7.3.23.

2. Boy, 16 years old, taken ill and admitted to hospital 18.2.24; half-brother, 15 years old, taken ill 7.3.24.

It is impossible to say whether in these cases the brother or sister caught the infection from the sick child but did not develop the disease for some weeks, or whether other members of the family (the parents, for instance) became germ-carriers, who subsequently spread the infection.

On the whole, the number of cases of family infection was remarkably small. It would seem that such an infection only takes place if there is a certain predisposition to the disease. The isolated cases which occurred in closed institutions such as children's homes, monasteries, boarding-schools, etc., would seem to bear out this theory. Such a *predisposition* is sometimes very marked in individual *families*, as we know is the case with some other diseases, and there is evidence that this is so in the case of meningitis also.

Instances of Family Predisposition to Meningitis.

1. *Family H.:* Husband died of meningitis 1911; wife 15.5.24, son (30 years old) 16.5.24.

2. *Family G.:* Boy, 5 months old, died of meningitis 1921; girl, 4 months old, 1923.

3. *Family R.:* Boy, 8 years old, died of meningitis 1919; girl, 4 years old, taken ill but recovered 1923.

4. *Family B.:* Girl, 20 years old, taken ill 1923; mother, brother and sister had also had meningitis in previous years (evidence given by district medical officer).

5. *Family Sch.:* Girl, 1 year old, taken ill with meningitis in the spring of 1923; sister, 6 months old, taken ill November 1923.

6. *Family W.:* Boy, 9 years old, taken ill with meningitis and recovered 1922; mother taken ill 24.3.23.

7. *Family K.:* Girl, 4 years old, taken ill; fifteen years previously a cousin of the mother had died of meningitis, and eight years previously a niece of the mother had an attack but recovered (information given by district medical officer).

8. *Family W.:* Husband, 56 years old, taken ill July 1924; a brother living with him in the same household had had meningitis a year previously, but it was not ascertained whether in the latter case the disease was of the meningococcal type.

9. *Family Ba.:* Daughter, 8 years old, died of meningitis in 1912; Sister, 11 years old, also died 1923.

10. *Family L.:* Son died of meningitis 1921; another son, 24 years old, taken ill with meningitis 1923.

11. *Family S.:* Daughter, 1 year old, died of meningitis 1924; mother's sister had also died of meningitis some years previously.

12. *Family Kr.:* Grandmother, 48 years old (living in the same household), had meningitis in 1921 but recovered; in 1924 a child, 8 months old, was taken ill and died.

In most of the cases described above it is not likely that there were still any germ-carriers left who had been infected at the time of the first outbreak; it is highly probable that the second outbreak was due to a fresh infection where a predisposition to the disease already existed. Nevertheless, even if it is assumed that infection can be carried for so long, the recurrence of the disease can only be explained — in view of the comparative rareness of infection within a family — by the fact that there is a special and well-marked predisposition to the disease in the family in question. Of the origins of this predisposition we as yet know nothing; it appears to arise at one period of life and then to disappear again. In the course of our enquiries, however, we found certain factors which may have been responsible for such a predisposition in individual cases. We obtained our information on this point from the replies to questions regarding previous attacks of the disease.

3. Predisposing Factors.

The view expressed by *Westenhöfer*[1] on the basis of the autopsies which he made at the time of the Upper Silesian epidemic in 1904-5, namely, that a lymphatic

[1] *Klinisches Jahrbuch,* 1906, vol. 15.

constitution, and especially a *status thymico-lymphaticus*, greatly increased the susceptibility to infection, is not confirmed by our evidence. Such constitutional defects, or the diseases and the results of autopsies characteristic of them, were only observed in exceptional cases. The question as to previous illnesses much oftener elicited in reply information regarding diseases of an entirely different kind, or else simply the statement: "Has always been healthy". Only in seven cases were adenoid growths reported, and rickets seven times, while in one case the autopsy revealed a decided status thymico-lymphaticus (weight of thymus 31 grammes in a child of 1 year and 9 months). On the other hand, *otitis media*, usually in a chronically relapsing form, frequently occurs both in the course of the illness itself and in the medical history of the case. It is as common among adults as among children, and in some cases may be the consequence of a lympathic constitution. Frequent mention is made of diseases of the pulmonary organs, such as *pneumonia* and *bronchitis*; references to *tuberculosis* (9 cases) and syphilis (4 cases) are relatively rare.

Trauma.

Trauma, on the other hand, is surprisingly frequent both as an immediate precursor of the disease and also in the medical history of the cases. In individual instances where trauma is practically simultaneous with the outbreak of the disease it is not always possible to decide which is the primary affection. Sometimes loss of balance and consequent falls may well be the first symptoms of incipient meningitis, but most of the observations made point rather to the fall itself as the original cause. In most cases of trauma it was the head that was affected, but occasionally it was the whole body that had sustained the injury. In some cases we have used the term trauma in a wider sense, including serious operations, particularly to the head.

In 21 *cases trauma immediately preceded the illness.*

These cases were as follows:

82. Miner, 21 years old, fell on his head 29.1.23; at once had pains in the head, followed soon after by vomiting. On the next day stupor, stiff neck, etc. (meningococci in the spinal fluid).

148. Boy, 2 years old; fell from a chair 6.9.23; refused his food 8.9.23; unable to speak 9.9.23; seized with a typical form of the disease (meningococci in the fluid).

146. Woman, 59 years old; 19.5.23 headache and vomiting; fell on the back of her head; 20.5 meningitis (meningococci in the fluid).

185. Boy, 2 years old; had a severe fall on a stone floor 24.4.24; taken ill 27.4 with vomiting, screaming and convulsions (meningococci in the fluid).

187. Man, 20 years old; had a fall from a motor-cycle 23.3.24; bleeding at mouth, nose and ears, fracture at base of skull; 27.3 fever and otitis; 28.3 stiff neck; the disease followed a typical course (fluid very full of cells, no bacteria).

308. Girl, 12 years old; had a severe fall 22.2.24; taken ill 23.2 with violent vomiting but no fever; 25.2 nose-bleeding, stupor, meningitis (large quantities of bacilli in the fluid and nose.).

306. Girl, 15 years old; attacked with influenza 14.2; 18.2 otitis media purulenta; 19.2 operation on the ear; 20.2 meningitis with œdematous swelling of the occiput (meningococci in the fluid).

336. Boy, 7 years old; fell and struck his forehead 10.10.23; 11.10 cold, fits and meningitis (meningococci in the fluid).

549. Girl, 8 years old; 26.4.24 fell while playing in the street and struck the right side of her head; violent pains; 27.4 meningitis (meningococci in the fluid).

598. Man, 52 years old; had been unwell for some days; on the evening of 14.6.24 took too much alcohol, was knocked down by an electric tram, fell on his head; commotio cerebri with retrograde amnesia and stiff neck; died (autopsy showed fracture of the base of the skull) (meninogococci in the fluid).

536. Boy, 9 years old; fell and injured both knees and shins; taken ill two days later (meningococci in the fluid).

788. Boy, 6 years old; a short time before being taken ill had been struck on the head by a missile (no bacteria in the fluid).

792. Child, 6 months old; immediately before being taken ill had a hæmatocæle removed from the head (meningococci in the fluid).

740. Miner, 31 years old; 26.10.23 injured through stones falling on his head; headache, daily increasing in severity; 11.11 vomiting and fever, meningitis (meningococci in the fluid).

872. Boy, 11 months old; 10.4.24 had a fall; hæmorrhage above the left eye; afterwards ailing; 20.4 fever, convulsions, etc. (meningococci in the fluid).

1041. Man, 44 years old; 27.9.24 knocked down by a cyclist (autopsy showed fracture of skull); 29.9.24 fever, meningitis developed (meningococci in the fluid).

1185. Boy, 7 years old; had a bad fall 5.6.23 but went on playing and attended school for two days afterwards. Severe headache, insomnia, fever, 8.6 (meningococci in the fluid).

1119. Girl, 15 months old; fell from a chair 1.5.24; two hours afterwards vomiting and slight fever. 2.5 exanthema; 8.5 renewed vomiting and fever, meningitis (meningococci in the fluid).

120. Woodcutter, 32 years old; knocked down by a falling tree at the end of June 1923. Taken ill 4.7 with headache, stiff neck (meningococci in the fluid). Had already, in 1919, injured the base of his skull and fractured his lower jaw.

1171. Girl, $3^1/_2$ years old; fell off a step (not on her head); taken ill two days later (meningococci in the fluid).

605. Boy, 18 months old; first pneumonia, metapneumonic empyema; had to be operated; then tracheotomy on account of a foreign body in the windpipe, followed by symptoms of meningitis (meningococci in the fluid).

In the cases so far described, trauma and the outbreak of the disease were almost simultaneous. In the following 17 cases, however, we find trauma from one to several weeks before the outbreak of the disease:

1207. Boy, 14 years old; fell from a wall; illness began about eight days later (no lumbar puncture made).

752. Miner's son, 8 years old; 24.2.23 fell heavily on his head; illness began 4.3.23 (meningococci in the fluid).

45. Boy, 1 year old; fell heavily on his head 2.2.23; illness began, with convulsions, 10.2.23 (meningococci in the fluid).

1128. Boy, 2 years old; 8 to 14 days before the attack had a fall, striking the back of his head, followed by nasal hæmorrhage; disease first appeared 5.6.24 (pneumococci in the fluid).

1071. Boy, 8 months old; 16.11.24 knocked his head against a wall; disease began with cold fits 1.12.24 (meningococci in the fluid).

1134. Girl, 6 years old; three weeks before being taken ill had a bad fall; 14 days previously had been run over by a cyclist and fell on the back of her head; afterwards continual headache until the disease suddenly developed (no bacteria in the fluid).

168. Boy, 14 years old; 12.5.23 a lamp fell on the back of his head, leaving a small abrasion; 25.5.23 illness began (meningococci in the fluid).

22. Man, 27 years old; 7.8.23 received a blow on the head while wood-cutting; unconscious for 15 minutes. Illness began 27.9.23; shot in the head during the war (meningococci in the fluid).

109. Miner, 47 years old; about four weeks before illness began had an operation for otitis media purulenta (drilling of the bone); illness began, accompanied by increasing pains in the head (meningococci in the fluid).

21. Boy, 4 years old; fell down steps four weeks before illness began (meningococci in the fluid).

1064. Man, 27 years old; four weeks previously had an accident, being caught in a stamping-machine; afterwards had headache and back-ache (meningococci in the fluid). Had been buried by a fall of earth during the war.

1143. Boy, 13 years old; four weeks before illness a drunken man struck him violently behind the right ear with a stick; illness developed gradually (meningococci in the fluid).

1130. Girl, 8 years old; fell out of bed; afterwards had fits of screaming and frequently pressed her hands to her head; illness began four weeks later (meningococci in the fluid).

1202. Boy, 9 months old; fell out of a vehicle four to six weeks previously; no very noticeable symptoms; illness began 9.6.23 (meningococci in the fluid).

1132. Boy, 10 years old; three months before illness began had a bad fall, followed by swelling on the forehead, and headache; illness began 10.7.24 (meningococci in the fluid).

785. Boy, 8 years old; three months before illness began had concussion of the brain through a fall down cellar steps.

602. Boy, 14 years old; three months before illness began had his tonsils removed; illness began suddenly with a fainting fit (meningococci in the fluid).

In the medical history of 17 other cases injuries received some time before the attack itself were recorded. Thus, a child, 2 years and 3 months old, had been struck in the face with a bottle seven months before being taken ill, and a man, 23 years old, while playing football four months before being taken ill, had a severe fall which for four weeks incapacitated him for work. A miner, 19 years old, had had a mining accident in the previous year, by which he lost five upper teeth. In 1919 a workman fell heavily on the back of his head from a height of one metre and in the same year had two epileptic fits. In other cases of traumatic antecedents the patient had a fall from a bicycle some years previously; had a railway accident three years previously, causing a fracture of the skull; had fallen out of bed two years before; had been run over; had fallen from a ladder. In several cases the patient had been shot in the head or buried under a fall of earth during the war. In one case where the previous history was unknown, the autopsy revealed old centres of cerebral contusion at the base of both lobes. In several instances chronic otitis developed as the result of head injuries.

Altogether 55 *cases were found in which the case-sheet revealed a possible connection between meningitis and previous accidents, especially accidents to the head.* In a whole series of cases this connection was unmistakably established by the course of the disease, and in the majority of cases it was, to say the least, highly probable. In medical literature we also find occasional indications of this connection in individual cases. *Here, however, we have a rare wealth of material which urgently calls for epidemiological investigation.*

4. Clinical Characteristics.

The general *clinical characteristics* of epidemic meningitis have already been determined. It is true that the symptomatology takes many forms, but its main features are always practically the same. In the medical records which we examined, the course of the disease varied very little from the normal. We found all the characteristic forms already described by previous observers — the fulminating form, in which the patient passes in a few hours from perfect health to death; the acute form, which lasts from four to six days; and the protracted forms, which last intermittently for weeks or even months. We constantly found records of herpetic eruptions spreading over the face, nose, palate and neck, and occasionally even as herpes zoster over the trunk. We found herpes even in quite young children, although it is never supposed to be found in children under three years of age (Jochmann-Hegler, *Lehrbuch der Infektionskrankheiten*, second edition, Berlin 1924); one was a case of a girl 6 months old and three others were children of 2 years. *Septic symptoms* were found quite often, such as extensive *exanthema* and petechial epidermic hæmorrhage (38 cases), more or less severe swelling of the

joints (in one case meningococci were cultivated from the effusion in the knee-joint), and, by no means rarely, clear cases of *nephritis*. *Otitis media purulenta* is very frequently mentioned both in the medical history of cases and in the accounts of the course of the illness itself. Often it appeared as the first symptom, but in most cases it developed in the course of the disease; in many cases it was only discovered by necropsy. The discharge from the ear sometimes contained meningococci, but mostly other bacteria such as colibacilli, pneumococci or streptococci. Suppuration of the neighbouring cavities was also by no means rare. The course of the *fever* did not conform to any definite rule; we may mention one case in which there was no rise in temperature at all, whereas in others the temperature fluctuated violently, and in others, again, it kept at a moderate level.

Pneumonia was most commonly mentioned as the initial disease immediately preceding an outbreak of meningitis (24 cases). The usual forms are typical croupous or fibrinous pneumonia, followed immediately by meningitis. As in 18 of these cases meningococci were found in the spinal fluid, we must probably regard the pneumonia as merely a forerunner of meningitis, as a factor which facilitated the penetration of meningococci which were already present. We are therefore not justified in concluding that, if the test for meningococci fails, we may assume the ætiology of meningitis to be pneumococcal because there was initial pneumonia. The same argument also applies to the 21 cases in which the initial disease was *influenza*, and the 14 cases where it was *bronchitis*. The fact that the presence of meningococci has often been proved in such cases shows that acute diseases of the respiratory organs generally increase the predisposition to meningitis.

On the other hand the cases of *pharyngitis*, *rhinitis*, *angina* and also *otitis media* occurring at the outset of the illness may be regarded as the first symptoms of meningococcal infection, whereas the concurrence of tuberculosis, measles, scarlet fever or paratyphus with meningitis must be regarded as purely fortuitous. Thus, in one case only, tuberculosis bacilli were found in the fluid from the first lumbar puncture, and meningococci were only found after several punctures had been made. In another case the illness followed the opposite course; meningococci were found several times in the spinal fluid for a month, and then miliary *tuberculosis* developed and rapidly led to death.

We have already mentioned that in many cases the course of meningitis was very intermittent. Sometimes the interval was so long and the patient was in such good health that the recurrence of symptoms of the disease could only be regarded as a *relapse*. Relapses of this kind, which also enable certain conclusions to be drawn regarding immunisation processes, were noted in 25 cases. Often, after symptoms of the disease had disappeared, the patient left hospital as cured and — in the case of adults — as fit to return to work. After some days or weeks, however, he had to be re-admitted with fresh symptoms of meningitis. The meningococci, which according to the previous tests had gone, reappeared. Sometimes the relapse was

accompanied by inflammation of the pharyngo-rhinal cavity. The shortest interval between apparent recovery and relapse was four days.

The following are examples of relapse:

985. Miner, taken ill 23.5.23 with fever, stiff neck and general discomfort (meningococci in the spinal fluid); discharged 14.7.25 as cured; 24.7.23 fresh attack, admitted to hospital 26.7.23: headache, stiff neck, fluid turbid (no meningococci found); 6.10.23 discharged as cured; 29.10.23 again attacked with fever and stiff neck and taken back to hospital unconscious; died the same day, so that no further lumbal punctures were possible.

In other cases several months elapsed between the original illness and the relapse.

326. Woman 44 years old; taken ill 7.1.24 at Cologne and was discharged as cured at the beginning of February; 6.4.24 fresh attack at Oerath, Erkelenz (meningococci in the spinal fluid).

386. Boy, 9 months old; had been subject to convulsions and vomiting since February 1924 and was in hospital with unmistakable meningitis 7.4-29.5 (meningococci in the fluid); further attack with fatal result at the beginning of August 1924.

207. Man, 21 years old; in 1922 treated for cerebro-spinal meningitis in Dortmund Hospital; fresh attack 22.3.23 (meningococci in the fluid).

22. Man, 27 years old; August 1923 treated in hospital for meningitis; 14 days after the temperature became normal had a relapse, was then discharged as cured; fresh attack 18.4.24 (meningococci in the fluid).

98. Boy, 2 years old; first illness 12.1.23; second attack 24.5.23 (meningococci in the fluid.)

17. Girl aged 2 years; taken ill 11.8.23; discharged as cured 2.11.23; fresh attack 15.2.24. Died 24.2.24. On both occasions meningococci were found in the spinal fluid.

In a number of other cases the attack was probably preceded, some time previously, by an abortive form of meningitis.

621. Boy, 13 years old; taken ill 17.2.24 (meningococci in the fluid); in the previous summer (1923) had complained of headache and was kept in bed with fever and vomiting for several days at a time, with intervals of several weeks;

in the intervals was very sensitive to noise; had violent attacks of this kind in the middle of December and the middle of January.

671. Boy, 7 $^1/_2$ months old; taken ill December 1923 (meningococci in the fluid); at 5 months taken ill with pneumonia accompanied by stiff neck, hyperæsthesia and convulsions; since then, rapid increase in the growth of the head, but otherwise cured.

1150. Girl, 6 months old; taken ill 20.11.24 (meningococci in the fluid); two months previously had refused her food and was attacked with fever, hyperæsthesia, severe catarrh, herpes labialis, slight stiff neck; period of illness about 10 days.

1195. Woman, 42 years old; taken ill 11.2.23 (meningococci in the fluid); six weeks previously, affected with violent headache and vomiting and compelled to take to her bed for some days.

121. Man, 20 years old; taken ill 20.9.23 (meningococci in the fluid); a week and a half previously attacked with sudden stiffness of the whole body, headache and hyper-æsthesia; slight convulsions. This condition lasted a day, but recurred in a mild form two days later; the subsequent illness began with the same symptoms.

Lastly, we may mention the case of a man 30 years old, who 21 years before the attack referred to had been ill for 12 weeks with meningitis. No information could be obtained as to the ætiology of the first attack.

From the case mortality statistics previously given we know that about 60 per cent of the cases ended fatally; moreover, the health of those who recovered was often very greatly impaired, sometimes only for a short time, but generally for life. The number of *secondary illnesses* was fairly high. We obtained information on this subject in 43 cases:

In 18 cases the hearing was impaired (12 cases of complete deafness, 1 of deafness in one ear and 5 of slight deafness).

In 5 cases the eyesight was impaired (2 cases of total blindness (atrophy of the optic nerve), 1 case of blindness in one eye, 1 case of greatly impaired sight and 1 of strabismus).

In 4 cases the physical and mental development was generally impaired (2 cases of idiocy, 1 of hydrocephalus, 1 of arrested development (a child of 2 $^1/_2$ years could neither speak nor walk)).

In 16 cases there were nervous affections (in 4 cases erethism, in 8 paralysis or weakness of certain parts of the body; in 3 cases neuralgic symptoms, and in another loss of equilibrium).

Our material also throws some light upon the effects of *serum-therapy.* In most cases there are no details as to the method of application, quantities or time of the first injections, so that an exact estimate of the results is hardly possible. We cannot therefore do more than ascertain the course of the illness in those cases where serum was undoubtedly used and compare them with other cases in which it obviously was not used.

In all, anti-meningococcal serum treatment was reported in 287 cases — 260 of meningococcal meningitis and 24 where the ætiology was doubtful. Of these 287 cases, 173 ended fatally, the case fatality thus being 60.3 per cent. As the mortality for *all* cases, whether treated with serum or not, is also about 60 per cent, these figures give *no* indication as to the effect of the serum.

Moreover, there is no reason to believe that the cases treated with serum were the most serious ones. Presumably serum treatment was given exclusively in hospitals, and as about 86 per cent of all the patients received hospital treatment, and as, moreover, a considerable proportion of these were treated without serum, the unsatisfactory results cannot be explained by the exceptional gravity of the hospital cases alone. There is no doubt, of course, that serum treatment applied at an early stage and repeated at frequent intervals gives good results in individual cases. So far, however, the anti-meningococcal serum has not proved nearly as successful as other serums, such as *Behring's* diphtheria serum, for example.

Summary of Clinical Epidemiological Results.

1. Very rarely indeed was it possible to find the source of infection in individual cases; these included infection from other meningitis patients and from healthy germ-carriers; probably, too, from persons suffering from abortive forms of meningitis.

2. Cases of several members of the same family being infected were noted but were rare.

3. Examples of a decided family predisposition were found, several members suffering from meningitis at different periods.

4. The susceptibility to the disease was increased by otitis and above all by trauma, particularly of the head. In many cases the outbreak of the disease was directly due to these causes.

5. Among special clinical features mention should be made of septic symptoms, nephritis and otitis media. Herpes febrilis was observed even in children under three years of age.

6. Among the initial diseases leading up to meningitis the most important were diseases of the respiratory organs and inflammation of the pharyngeal cavity.

7. A number of instances were observed of relapse some weeks or months after the first attack.

8. The number of secondary diseases following upon meningitis which leave the health of the patient permanently impaired even after recovery is fairly large. The organs chiefly affected are the eye, ear and the central and peripheral nervous systems.

9. We could find no evidence of the influence of serum-therapy on the course of the disease.

From our material it is possible to draw certain conclusions as to the general epidemiology of sporadic outbreaks of meningococcal meningitis. The number of cases of direct contagion is very small, and proved cases of infection by healthy germ-carriers among the persons surrounding the patient are also by no means frequent. Again, unfavourable living and housing conditions, which are often a contributary cause of the spread of other infectious diseases, play a much smaller part in the propagation of cerebro-spinal meningitis. *Contagion*, therefore, cannot be regarded as a very serious factor. Predisposition, on the other hand, appears to be important, considering that the large majority of cases occur at an early age, that the disease preferably attacks the male sex, members of one and the same family show susceptibility to the disease, trauma and otitis media play a considerable part, and the disease is particularly prevalent among miners and their families. All these factors — among which the question of the prevalence of the disease among miners deserves special attention — lead us to suppose that the presence of meningococci in healthy persons is perhaps more frequent than has hitherto been generally believed. At the time of the great epidemic of 1904-05 in the industrial area of Upper Silesia, VON LINGELSHEIM[1] observed that meningococci were found in the pharynx of 93.8 per cent of cases and in 15 per cent of their near relations, while among persons suffering from other diseases and among healthy persons not exposed to infection the percentage was nil. Similar observations were subsequently made in other parts of Germany; sometimes the percentage among relations of patients, where

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[1] *Klinisches Jahrbuch*, 1906, vol. 15.

tests could be made at once and on the spot where the material was obtained, was found to be as much as 74 per cent.

Generally speaking, the number of germ-carriers was estimated to be at least ten times as great as the number of patients. All these observations were made among persons immediately surrounding the patients, and towards the end of the epidemics this percentage also decreased. In periods free from epidemics and among persons not exposed to infection, the proportion of proved germ-carriers was very small. Instances to the contrary, when the tests were carried out on a small scale, were exceptional (in one case 25 per cent germ-carriers). Extensive tests carried out at Munich in 1910 on over 9,000 soldiers revealed about 2 per cent healthy germ-carriers. In recent years, however, particularly in England and Japan (Glover[1], Kondo[2], etc.), evidence has been obtained showing a much higher proportion. Proportions as high as 20 per cent in non-infectious surroundings and at a period free from epidemics are not regarded as at all unusual. When we remember that there are technical difficulties in detecting the presence of meningococci in the nasal cavity of a healthy person, that the method of obtaining them, the time of transport and the experience of the investigator are all-important factors; when we remember, too, that individual cocci very easily escape cultivation, we cannot attach any undue importance to the negative results of the tests. We may quite possibly find that meningococci show a "limited ubiquity" in the pharyngeal organs of healthy persons (Gruber and Kerschensteiner[3]). The effect of otitis, of diseases due to chills and particularly of head injuries allows the hitherto harmless parasites to penetrate to susceptible organs. We should then be led to take the view that infection does not proceed through the blood but *per continguitatem*. (The occasional discovery of meningococci in the pus from the cribriform bone, sphenoid bone or from otitis media points to this possibility.)

If this is the case, cerebro-spinal meningitis would have to be included in the group of diseases which Lentz[4] has recently termed "selective diseases". He himself includes cerebro-spinal meningitis in this category and considers "that the primary disease caused by the meningococcus is an epidemic form of pharyngitis, and only in isolated cases, where special conditions of the lymphatic vessels favour such a development, can the meningococci find their way from the pharynx to the meninges and so cause the grave symptoms of meningitis".

The question whether the pharynx and the lymphatic apparatus really play the part which Lentz ascribes to them must remain unanswered, but it is clear even from our own investigations that meningitis must be characterised as a "selective" disease.

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[1] *British Medical Journal*, 1920.
[2] *Tohoku Journal of Experimental Medicine*, 1923, vol. 4.
[3] *Ergebnisse der inneren Medizin und Kinderheilkunde*, 1917, vol. 15.
[4] *Klinische Wochenschrift*, 1924, vol. 3.

Does this factor perhaps explain the remarkable frequency of the disease among miners ? We observed this frequency during the two years covered by our report, which were free from regular epidemics; it was also demonstrable in previous years and was particularly marked during epidemics. Meningitis has been sporadic in mining districts for decades, and has from time to time assumed epidemic proportions. Nevertheless, mining districts are not the only centres where meningitis persists. At Berlin, for example, cases of the disease are reported every year, and areas which are primarily agricultural, such as Pomerania and East Prussia, have also been centres of the disease. JEHLE's theory [1] that epidemics of cerebro-spinal meningitis originate *solely* in coal-mines is therefore untenable. Nor is it true that the disease spreads *almost entirely* in places where underground work is carried on. There is no doubt, however, that the conditions obtaining in coal-mines are favourable to the spread of the disease. Two factors have been adduced in explanation of this remarkable fact. In the first place, the atmospheric conditions in mines, which, according to JEHLE, constitute what might be described as a "vast natural incubator" on account of the moist heat and darkness. In mines, meningococci, which elsewhere have very feeble powers of resistance, can survive for some days even outside the human organism. The conditions in mines are also favourable to direct personal contagion. This mode of transmission is the second reason given for the spread of the disease. A large number of miners are crowded together in a small space. They often work in low galleries with their heads close together. There is practically no ventilation and the air is full of coal-dust, which inclines to coughing and spitting. For this reason pharyngitis is very common among miners.

The objection to this argument is that the atmospheric conditions in mines must favour the development not only of meningococci but also of the germs of other infectious diseases, and, further, that it is only partly true that a number of miners are collected together at one spot, since in reality the only persons working together are the members of a gang "at a coal-face", and that the crowding is not so great as to explain the abnormal propagation of the disease among them. These objections are undoubtedly true in part, but they may be disregarded if the effect of other factors is added to that of the atmosphere and of overcrowding. In point of fact, factors of this kind do exist. HEYMANN and FREUDENBERG [2] recently published a book entitled *Morbidity and Mortality among the Miners in the Ruhr District*, which contains very valuable statistical material. Owing to the method of collecting the statistics, this work makes no mention of meningitis at all, and it is impossible to deduce from it the relatively small number of cases. It states, however, that there are two factors which exercise a decisive influence over morbidity and mortality among miners, namely, atmospheric conditions and accidents. The climate in the mines, which involves abnormal conditions of life, and the sudden change of temperature on entering and leaving a mine, give rise to a number of serious

[1] *Münchener Medizinische Wochenschrift* 1906, vol. 63.
[2] *Morbidität und Mortalität der Bergleute im Ruhrgebiet.* Düsseldorf, 1925 (Baedeker).

affections of the respiratory organs, particularly among young miners who are not inured to the conditions of work underground. Illnesses due to chills — particularly bronchitis and pneumonia — are very common. In 1917, for example, it was found that out of every 10,000 miners, 602.8 had suffered from bronchitis and 58.4 from pneumonia. If we add pharyngitis, which may almost be regarded as an occupational disease among miners, we have the very affections of the respiratory organs which are found most frequently in the medical history of cases and as the initial symptoms of meningitis.

As we have already pointed out, trauma creates a special predisposition to cerebro-spinal meningitis, and the abnormal frequency of accidents is a characteristic feature of mining. *More than one-third of all the deaths which take place among miners are due to accidents while at work.* To this must be added accidents unconnected with their work. According to the figures given by Heymann and Freudenberg, these also constitute an important factor.

There are thus several reasons why mining conditions are particularly favourable to the development of the disease, namely, atmospheric conditions underground, overcrowding while at work, and diseases due to chills and accidents. The limited ubiquity of meningococci among healthy persons is increased by these conditions. The germs spread to a larger number of persons, and the influence of the factors which ordinarily create a predisposition is increased. The result is a rise in morbidity, not only among the miners themselves but also among their families, who are particularly exposed to the risk of infection.

Further investigations will be necessary to determine whether in other countries meningococcal meningitis develops, at periods when it is not actually epidemic, in accordance with laws similar to those which we have observed in Prussia.

STATISTICAL TABLE

Meningitis in Prussia 1923-24.

Local Distribution. Province	District	Population 30. 11. 1922	1923 Meningococcal Meningitis	1923 Doubtful Ætiology	1923 Ætiology not ascertained	1923 Different Ætiology	1923 Total Number of Cases reported	1924 Meningococcal Meningitis	1924 Doubtful Ætiology	1924 Ætiology not ascertained	1924 Different Ætiology	1924 Total Number of Cases reported	Number of Reported Cases of Cerebro-spinal Meningitis per 100,000 Inhabitants 1923	1924
East Prussia		2,390,261	11	4		1		8		1			0.67	0.37
	Konigsberg	960,997	8	1			9	7				7	0.93	0.72
	Gumbinnen	605,174		1			1			1		1	0.16	0.16
	Allenstein	556,223	2	2		1	5	1				1	0.89	0.17
	West Prussia	267,867	1				1						0.37	0
Brandenburg		2,462,135	6	1	2	3		11					0.48	0.44
	Potsdam	1,162,176	4		1		5	6				6	0.43	0.51
	Frankfort	1,299,959	2	1	1	3	7	5				5	0.53	0.39
Berlin		4,036,925	37	10	2	12	61	42	9		9	60	1.51	1.48
Pomerania		1,891,219	10	7			17		6		1	7	0.84	0.37
	Stettin	934,807	10	4			14		6			6	1.49	0.64
	Köslin	687,970		3			3				1	1	0.43	0.14
	Stralsund	268,442											0	0
Marches of Posen and West Prussia		347,080						1				1	0	0.28
Lower Silesia		3,153,330	24	7	9	4		15	3	2			1.07	0.63
	Breslau	1,918,970	21	4	9	2	36	13	2	2		17	1.87	0.88
	Liegnitz	1,234,360	3	3		2	8	2	1			3	0.64	0.24
Upper Silesia		1,365,139	21	17	44	5		21	3	1	1		6.37	1.90
	Oppeln	1,365,139	21	17	44	5	87	21	3	1	1	26	6.37	1.90
Saxony		3,294,314	21	3	3	6		14	1	1	1		1.00	0.51
	Magdeburg	1,304,250	10	2	3	4	19	6	1		1	8	1.45	0.61
	Merseburg	1,426,826	8	1		2	11	8		1		9	0.77	0.00
	Erfurt	563,238	3				3						0.53	0

Schleswig-Holstein		1,519,673	11	4	1	2		12			1		1.18	0.85
	Schleswig	1,519,673	11	4	1	2	18	12			1	13	1.18	0.85
Hanover		3,165,644	17	3	5	5		14	3				0.94	0.53
	Hanover	809,388	3				3	5				5	0.37	0.61
	Hildesheim	583,120	1	1			2		1			1	0.34	0.17
	Lüneburg	597,855	5		2	2	9	2				2	1.50	0.33
	Stade	456,944	2	1	1	3	7	2	1			3	1.53	0.65
	Osnabrück	427,092	4	1	1		6	2	1			3	1.40	0.70
	Aurich	291,245	2		1		3	3				3	1.03	1.00
Westphalia		4,656,453	110	34	91	8		81	48	34	4		5.21	3.56
	Münster	1,283,698	33	4	19	2	58	29	12	11		52	4.51	4.05
	Minden	784,203	10	1	3		14	6	8	1	1	16	1.78	2.04
	Arnsberg	2,588,552	67	29	69	6	171	46	28	22	3	99	6.60	3.78
Hesse-Nassau		2,376,223	15		6	1		13	1		1		0.92	0.63
	Cassel	1,066,407	6		3		9	2	1		1	4	0.83	0.37
	Wiesbaden	1,309,816	9		3	1	13	11				11	0.99	0.80
Rhine Province		7,291,354	88	18	52	11		69	16	12	2		2.31	1.35
	Coblenz	782,541	2	1			3	3				3	0.38	0.38
	Düsseldorf	3,943,290	56	15	42	6	119	37	15	7	1	60	3.01	1.52
	Cologne	1,424,343	6		4		10	11	1	2	1	15	0.70	1.05
	Treves	452,818	1	2	4		7	9		1		10	1.54	2.28
	Aix-la-Chapelle	688,362	23		2	5	30	9		2		11	4.35	1.59
Hohenzollern		72,580											0	0
	Sigmaringen	72,580											0	0
No. of patients treated in Prussian hospitals: origin Detmold														
,, Anhalt								1				1		
,, Oldenburg								1				1		
,, Hesse						1	1							
,, unknown											1	1		
	Total			3			3							
	(1221)	38,022,330	371	111	216	58	756	303	91	51	20	465	1.98	1.22

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LEAGUE OF NATIONS

HEALTH ORGANISATION

PUBLIC HEALTH SERVICES

IN THE

FRENCH COLONIES

BY

S. ABBATUCCI, M.D.,

of the French Colonial Service,

Member of the Supreme Health Council for the Colonies (Paris).

LEAGUE OF NATIONS.

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GENEVA, February 1926.

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ERRATUM

PREFACE, *2nd line:* For "Unlike" read "Like".

PREFACE.

Health legislation and administration form part of the activities which go to make up a nation's public life. Unlike political institutions, health institutions are not throughout controlled by a single authority and cannot be developed in accordance with a definite scheme. The innovations and changes effected in the course of time have mainly been the result of chance. Life itself has put forward its problems. It is the needs of the hour, in short, which have led the legislator and the administrator to take action. As may be easily understood, the conditions governing the problem of public health have varied enormously at different times and in different places. The technical weapons and the moral forces at the disposal of Governments have been wholly different, and as a result each public health organisation has assumed a form of its own.

Accordingly, any attempt to weigh the merits of foreign public health organisations is exceedingly difficult, even for health experts, and yet in view of the complexity and the increasing number of international problems with which we are faced, a knowledge of these different institutions is urgently required. Without such knowledge it is hard to achieve any sort of co-operation and, in addition, any opinion which may be formed about the health conditions of a country is very liable to error.

Furthermore, reports on diseases supplied by different countries are difficult to compare with one another for the very reason that they come from different sources. Before any useful investigation can be carried out in this domain, the information provided must be arranged and harmonised, which demands a thorough knowledge of the various national health administrations.

The work of the Health Organisation of the League of Nations being purely international, the first care of this Organisation must be to remove as far as possible the many difficulties due to the diversity of sources. For this reason the Health Organisation decided to publish a series of monographs describing the form and working of the public health administrations in the different countries. For the writing of these reports

it secured the assistance of persons holding prominent posts in the different public health organisations.

It was at first intended that all these monographs should be prepared on set lines. For this purpose the Health Section of the Secretariat of the League of Nations sent a memorandum to the authors of the monographs with a view to obtaining reports which could be directly compared one with another ; but most of the writers preferred a greater measure of freedom in framing their statements.

In the series we have undertaken to publish, health administration is considered from the general point of view only. It is our intention later to publish a number of studies on certain special aspects of public health, which will supply further and more detailed information on these different aspects.

In publishing the general studies, we have been greatly helped by the generous financial aid given by the International Health Bureau of the Rockefeller Foundation.

Geneva, February 1926.

HEALTH SECTION OF THE SECRETARIAT
OF THE LEAGUE OF NATIONS.

FOREWORD BY THE AUTHOR.

This book is the outcome of the efforts of all my colleagues in the Colonial Health Service, who have been serving for many years under the scorching tropical sun. My special thanks are due to Medical-Inspector Camail for the valuable assistance he has given me in drafting some of the medical monographs.

PART I.

CHAPTER I.

WORK OF THE HEALTH SERVICE DURING THE WAR.

The Health Service in the French Colonies was in full course of development when it was overtaken by the war in 1914. During the struggle, local activity was not only checked but diverted so as to render assistance to the home country. This assistance took the form of a *financial* effort estimated at nearly a milliard (including the North African possessions), an *economic* effort, calculated at more than 1,600,000 tons in the shape of imports of every kind, and a *military* effort, as a result of which 800,000 men were landed in France, 600,000 of these being fighting forces and 200,000 labour personnel [1].

In the unobtrusive and admirable work in our distant possessions, the Health Service played a leading part in maintaining satisfactory health conditions and in helping to recruit native contingents to replenish our reserves, whose numbers were depleted by years of continuous fighting.

It was the colonial doctor who was given the difficult task of choosing from among the representatives of very different races those capable of adapting themselves to new conditions of life, of preventing these troops from bringing infectious disease to France, and finally of protecting the men themselves from the dangers to which their transplantation exposed them. Two large recruiting centres were established, one at Dakar and the other in Indo-China.

On the outbreak of hostilities, plague was raging in our great Atlantic port. Three years later in 1917, the epidemic again appeared in Senegal. The two outbreaks claimed more then 10,000 victims and in the town of Dakar alone there were 1,425 deaths. The epidemic occurred at the period

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[1] *La mise en valeur des Colonies françaises*, by A. Sarraut, Minister for the Colonies (published by Payot & Co., Paris).

when the recruiting of the coloured contingents, who had at all costs to be kept free from infection, was being energetically carried on. The difficulty was particularly great in the case of the detachments—and they were the largest—which came down from Upper Senegal and Niger ; these had to be diverted from Saint Louis, an infected town, and taken straight to Dakar, the port of embarkation. The troops were transhipped from steamers on to barges in mid-stream and the men taken direct to the harbour station without entering the town. As soon as the troops arrived at the concentration camps round Dakar, the inoculations against plague were checked and completed, and at the same time the men were given shower baths and deloused, and their kit disinfected. The plague foci themselves were vigorously attacked; contaminated premises were destroyed or disinfected, patients and suspected cases were isolated, movement between towns was forbidden, deratisation was carried out wholesale, the Clayton process was applied to ships sailing for France, etc.

The Haffkin vaccine was first supplied by the Pasteur Institute in Paris, but the quantities were insufficient and deliveries irregular. Accordingly, the laboratory at Dakar proceeded to manufacture vaccine, and it is estimated that, in spite of great inherent difficulties owing to lack of glassware, more than 1 $^1/_2$ tons of lymph were produced. The results were remarkable ; 165,000 native troops were sent to France without a single case of plague being exported from the colony.

Indo-China was mainly called upon to supply additional labour for our war factories and provide men to serve as hospital attendants in sanitary units or as lorry drivers. Nearly 100,000 Annamites were sent to France for this purpose. Indo-China is so densely populated that it might have been considered an easy matter to choose men for service from a race generally recognised as being robust and inured to hard work in the fields. On that account, and owing to shortage of personnel, no doctor was at first attached to the commissions appointed to select the first batches of recruits in the villages. The medical tests, however, disappointed these expectations and sometimes as many as 80 per cent of the men presenting themselves were rejected. The main cause of these rejections was trachoma, the prevalence of which in the Indo-Chinese provinces amounts to a veritable social scourge. A service had to be organised to distinguish in trachoma cases old, healed and relatively non-infectious lesions from active ones which required definite rejection. Once enlisted the men were inoculated against smallpox and typhoid fever (with typhoid and paratyphoid vaccine locally prepared) and then treated for intestinal and cutaneous parasitic complaints (25 per cent of them were suffering from scabies). The stools of all recruits were carefully examined under the microscope. Carriers of hook-worm, amœbæ, etc., who in some detachments attained the proportion of 30-40 per cent, were specially treated.

Movements on this scale among the population of a country where cholera is endemic, and the inevitable overcrowding of barracks which were not designed to accommodate such large numbers, soon led to outbreaks of epidemics, which were immediately countered by the usual measures of isolation and disinfection and, later, by anti-cholera vaccination on a large scale. The vaccine was prepared at the Institute of Thai-Ha-Ap (near Hanoi) with carefully chosen germs. 23,000 labourers or soldiers were vaccinated in this way, with extremely satisfactory results.

Cholera was followed by cerebro-spinal meningitis, which first raged in West Africa and Madagascar in a most violent form and with abnormal symptoms, sometimes without any of the usual symptoms at all. This led to its character being mistaken. A correct diagnosis was only obtainable after difficult bacteriological research. Afterwards, the course of the disease, which was marked by successive intermittent attacks, necessitated the infected detachments being kept under observation and preventive treatment for several weeks longer, and the laboratories were compelled to examine hundreds of cases in their laborious search for germ carriers.

The transport shortage also largely added to the difficulties which confronted the Health Service. Small parties due to embark on a given date frequently had to prolong their quarantine for twelve days, or, if the boat was still longer delayed, a course of observation was suspended, to be resumed later. Sometimes a belated case of some transmissible disease would immobilise the whole of a detachment due to leave, and another had to be substituted in the case of which the freight costs, etc., did not always allow the full period of isolation to be observed.

The persons affected protested, sometimes very violently, against these delays, and everyone freely abused the tyrannical conduct of the Health Service. Some of the authorities themselves were inclined to criticise measures the efficacy of which sometimes seemed doubtful ; for the isolation conditions were not ideal and several epidemics at sea unfortunately emphasised, not indeed the uselessness of the measures, but the fact that they were not strict enough. The sanitary conditions of the transports, too, left much to be desired, due to the defective fitting-up of hastily converted merchant ships, to overcrowding, etc. Thus, in spite of careful inspection of the food supplies, small outbreaks of scurvy and beri-beri occurred on board. There was also an epidemic of conjunctivitis (Weecks bacillus).

The special susceptibility of the black races to tuberculosis led to strong measures being taken against this disease. A service was organised with the armies to track down cases of this disease, and at Saint Raphael two hospitals were used for the observation and treatment of all natives (African negroes, Malagasies, natives of Tahiti, and Kanakas) evacuated as suspected cases of tuberculosis. A selection centre, resembling that at

Saint Raphael, was established at Dakar to collect repatriated men from French West Africa and French Equatorial Africa. After examination the men were divided into two classes—incurables who were sent to hospitals and curables who were returned to their original colony with a health card. The latter were then sent to the dispensaries of the native medical relief service and subjected to periodical examination with a view to individual treatment. The result of these measures, which were strictly enforced, was to prevent the spread of the disease in the West African settlements, which to this day have remained almost immune from tuberculosis.

Then came the pandemic of influenza, which, with varying intensity, ravaged all our overseas possessions : French East Africa and French Equatorial Africa (Senegal, the Sudan, Mauritania, Dahomey, Guinea, Gabon, Chad, the Cameroons, Ubangi Shari, Middle Congo), Madagascar, Indo-China, Cochin-China, Oceania, the West Indies, Guiana, etc. The figures, although incomplete, are remarkable. The autumn-winter wave, with its serious pulmonary symptoms, swept over the whole of the African Empire, the disease being spread by germ-carriers, and it is estimated that nearly two-thirds of the Europeans and natives were attacked, the deaths amounting in some parts to more than 10 per cent of the total population. 1,498 deaths were recorded among the 15,300 inhabitants of the French settlements in Oceania. New Caledonia, however, escaped the epidemic, thanks to its insular position and the vigilance of the health authorities.

*
* *

After the war, the work that had been interrupted was actively resumed. A health campaign was set on foot to combat the various factors of depopulation and to inculcate in the natives elementary ideas of hygiene and prophylaxy. Great progress has already been achieved and the scientific discoveries of the last few years, particularly in parasitology, have completely transformed the methods of dealing with exotic diseases. The credits granted for public relief and public health were much larger in 1924 than in 1900, as may be seen from the following table :

Summary of credits allocated to the native medical relief service in the colonies.

COLONY	Year 1900	Year 1922	Year 1923	Year 1924	Year 1925
Indo-China	800,776	24,815,222	40,804,270	46,771,350	45,722,463
French West Africa	344,230	9,786,258	10,576,875	10,186,840	10,910,606
French Equatorial Africa	111,871	1,512,170	1,479,816	1,502,565	2,673,016
Madagascar	189,309	7,694,060	8,475,165	8,535,316	10,100,560
Cameroons	—	1,452,121	1,435,447	2,211,000	2,381,000
Togoland	—	516,776	816,416	915,635	1,137,311
Reunion	249,225	681,186	937,892	1,380,709	1,472,651
French Settlements in India	148,919	369,865	431.584	449.050	501,974
Guadeloupe	316,480	1,174,540	1,107,326	1,321,751	1,441,549
Martinique	314,400	1,411,190	1,552,017	1,920,203	3,270,173
Guiana	229,718	445,958	620,825	629,397	711,055
St. Pierre and Miquelon	21,751	42,612	36.618	323,269	261,609
Somaliland	18,100	183,791	193,630	278,505	274,989
Caledonia and Dependencies	94,192	844,258	864,982	885,072	883,480
French Settlements in Oceania . . .	2,746	430,000	480,801	905,014	957,160
Totals : . . .	2,841,717	51,360,007	69,813,764	78,225,676	82,699,596
Government Grants:					
New Hebrides . . .	—	20.000	20,000	20,000	—
St. Pierre and Miquelon	—	37,000	37,000	37,000	—
French Equatorial Africa (trypanosomiasis).	—	500,000	1,000,000	1,000,000	1,000,000
Grand total: .	2,841,717	51,917,007	70,870,764	79,282,676	83,699,596

CHAPTER II.

GENERAL INSPECTORATE OF THE HEALTH SERVICE : ITS FUNCTIONS AND DUTIES.

The General Inspectorate of the Health Service, which is under the direction of a Medical Inspector-General of Colonial Troops, is the central authority which from Paris directs, supervises and controls all the outlying health organisations scattered over the vast area of French colonial territories.

Its duties may be defined as follows :—

Secretariat.

Incoming and outgoing correspondence, keeping of records. Editing of *Annales de Médecine et de Pharmacie coloniales*. Relations with the Academy of Medicine, the Pasteur Institute, scientific institutions, the League of Nations, the Office International d'Hygiène, and the associations or commissions on which the General Inspectorate of the Colonial Health Service is represented. Exhibitions, conferences, congresses. Promotions and honorary awards.

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Technical questions relating to the medical service and the health of troops in the colonies, the working of the colonial hospital institutions (so-called " general service " hospitals and temporary stations, regimental and garrison infirmaries, mixed native hospitals).

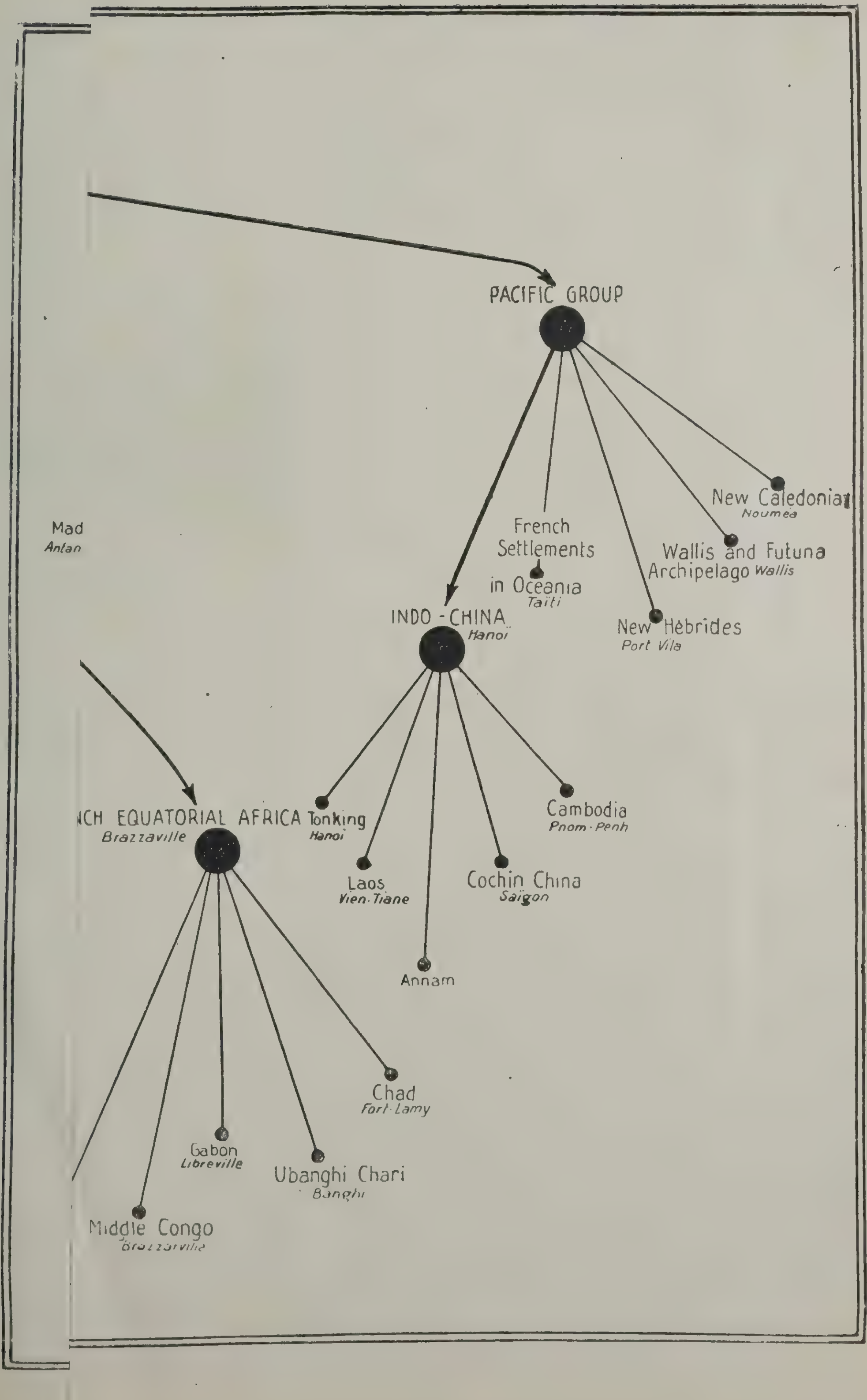
Technical medical questions relating to native colonial contingents (recruiting, hygiene and prophylaxy).

Medical services of the prisons administration (personnel).

Consular medical stations ; laboratories, other medical services (personnel).

Relations with the Directorate of Military Services for all questions concerning the personnel, material and budget of the Colonial Health Service, and operations of the Colonial Pensions Branch and establishments for supplying artificial limbs to disabled men.

Medical statistics of the troops and general service.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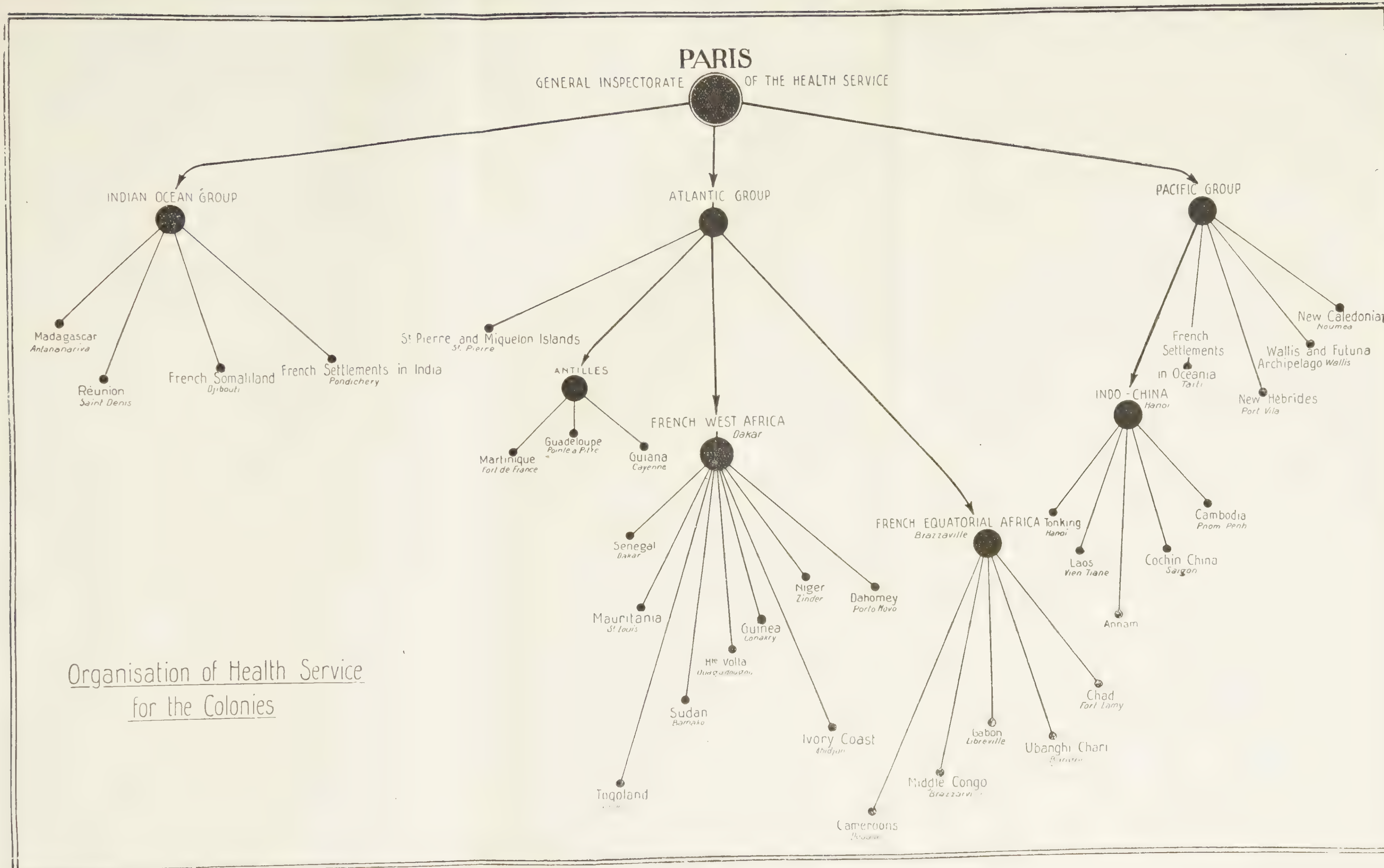

Organisation of Health Service for the Colonies

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Statistics of the civilian health services.

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Supplies of sanitary and pharmaceutical material. Checking of applications for transmission to the general Agency for the Colonies.

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Testing and examination of new medicaments and products submitted for use in the hospital services.

Organisation of mobilisation material and study of its adaptation to overseas requirements.

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SUPREME HEALTH COUNCIL FOR THE COLONIES.

Examination of files regarding pensions, awards, and the placing of persons on the retired, unattached or half-pay lists by reason of wounds or sickness. Medico-legal reconsideration of questions of extension of leave, sending to spas, fitness for colonial service, etc.

Giving of opinions on all health questions referred to it by the Minister or the Inspector-General of the Colonial Health Service.

Examination and classification of scientific work submitted to the Minister by the military and civilian medical officers in the colonies.

In the colonies the executive agents of the General Inspectorate of the Health Service are the directors or heads of the Health Service, who can call upon a large number of reserve workers in the person of colonial army doctors and chemists, doctors belonging to the Native Relief Service, doctors on temporary contracts and, lastly, private civilian practitioners.

The recruiting of this personnel has at all times been a question of serious concern to the General Inspectorate. It is impossible to make bricks without straw. If European doctors were the only source of supply, the problem would be insoluble ; a very large number would be necessary and the financial burden would be oppressive. Allowing one doctor for every five thousand natives—not an exaggerated figure considering the large area which frequently has to be covered—we must allow for about 11,400 doctors for 57,000,000 inhabitants. Supposing that each of them received 30,000 francs per annum, 342,000,000 francs would have to be provided for annually in the colonial and local budgets for the maintenance of personnel alone. Such expenditure is beyond the financial capacity of the French Colonial Health Service.

It has therefore been necessary :

(1) To make up for the shortage by the use of native doctors, and for this purpose efforts have been made to develop the native schools of medicine and to direct their curricula towards branches of knowledge more practical and more immediately useful for professional men intending to enter the health service. Thus to-day the medical schools at Hanoi, Antananarivo, Pondicherry and Dakar train medical assistants, vaccinators, midwives and sanitary guards, who contribute usefully towards the work of the service ;

(2) To adopt certain special methods for carrying out the work, such as the *groupe sanitaire* and the *mobile dispensary*, which make up by their mobility for the numerical shortage of doctors and which are able to reach the most distant communities, instil into the natives elementary ideas of hygiene and track down disease.

These methods have already given very satisfactory results. Proof of this is found in the following summary, which shows the numbers of the different categories of personnel working in the Relief Services in the colonies

TABLE OF PERSONNEL IN THE MEDICAL RELIEF SERVICES IN THE COLONIES.

1. European Personnel.	
Civilian doctors (officials)	187
Civilian doctors (not officials)	114
Colonial doctors	311
Civilian chemists (officials)	2
Civilian chemists (not officials)	105
Colonial chemists	29
Civilian nurses (men)	66
Colonial nurses (men)	172
Civilian nurses (women)	64
Colonial nurses (women)	41
Midwives	5
2. Native Personnel.	
Doctors	461
Chemists	36
Midwives	500
Civilian male nurses	1,994
Colonial male nurses	459
Female nurses	366
Vaccinators	78
Atoxyl-inoculation staff (Equatorial Africa)	81
Sanitary Police	210

CHAPTER III.

SANITARY PLAN OF CAMPAIGN.

The colonial territories of France are very extensive. They consist of Madagascar and its dependencies, Reunion, the Indian Settlements, French Somaliland, the Antilles Group (Martinique, Guadeloupe, Guiana), French West Africa, French Equatorial Africa with the mandated territories of Togoland and the Cameroons, the islands of St. Pierre and Miquelon, Indo-China, New Caledonia, the French settlements in Oceania, the Wallis Islands and Futuna.

These colonies and protectorates are equal in area to the whole of Europe, and they contain 57 million inhabitants. Apart from the small islands of St. Pierre and Miquelon, they are all situated in the tropics, that is to say, in surroundings which are absolutely different from those of

temperate countries, and in which it is acknowledged that Europeans can only live temporarily and by carefully attending to special rules of health. They are mainly lands to be exploited and not colonies for European settlers.

The geographical distribution and climatic conditions must be borne in mind ; they explain the magnitude and the difficulties of the task confronting the health authorities, whose aim it is to protect the human assets, Europeans (technical advisers) and natives (assistants), against the assaults of a tropical climate and endemo-epidemic diseases. The problem of colonisation is above all a demographic problem, which cannot be solved without the aid of the medical man.

It is difficult to frame a strictly uniform general programme for the Health Services of the colonies. The overseas possessions differ essentially one from another by reason of their soil and sub-soil, their ethnical characteristics, their financial resources and their administrative systems.

It is therefore impossible to impose the same health regime in all the colonies ; the system adopted must be elastic, and it is important that the parts of which it is composed should vary, in order that they may be better adapted to the area in which they are to be applied. It is impossible, for example, to compare French Equatorial Africa, with its primitive civilisation, its sparse population, poor food resources, and its few financial assets, with wealthy Indo-China, possessing abundant rice-fields, and inhabited by a people which, even before the arrival of the French, had reached an advanced stage of civilisation, although one differing from that of France.

The directors or heads of the Health Service areas are therefore called upon to prepare on the spot the details of a scheme of work. Nevertheless, the central authorities have to lay down general rules for guidance, so as to co-ordinate work carried out in all parts of the globe.

The health scheme is directed first and foremost towards the protection of the native races. Its details have appeared in successive instructions, most of which are to be found in the publications of the Minister for the Colonies [1].

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[1] See :—

1. Instructions of the Minister of the Colonies regarding the Development of the Services of Preventive Medicine, Hygiene and Assistance in the Colonies — Paris, December 3oth, 1924.

2. Circular of the Minister of the Colonies regarding the Campaign against Venereal Disease — Paris, April 25th, 1923.

3. Circular of the Minister of the Colonies regarding the Prophylaxis and Treatment of Leprosy — Paris, March 24th, 1924.

4. Circular of the Minister of the Colonies prescribing an Enquiry into Bilharziosis or Schistosomia — Paris, January 6th, 1923.

5. Circular of the Minister of the Colonies with regard to Vaccination against Smallpox — Paris, April 17th, 1923.

An instruction by the Minister for the Colonies, dated December 30th, 1924, enjoins upon all services the duty of co-operating in relief work for demographic and social purposes, and it indicates to the local administrations the important part they have to play in co-ordinating all the work done and in obtaining the best possible results.

In order to estimate the results of this health policy and to discover the factors liable to affect them, an Office of Health and Prophylaxy has been established in all the Colonial Health Services, which is virtually a demographic control office, collecting and collating statistics, studying movements of population, investigating the causes of any fall in the birth-rate, and similarly indicating the causes of a rise. All these particulars are forwarded regularly to the Department, which is thus kept fully informed of the state of public health throughout the whole of the French overseas possessions.

Further, an appeal is being widely made to private effort with a view to establishing in the large settlements in Asia, the Pacific and Africa, a central committee for the protection of native children. The work of these committees, which would be financially supported by colonial associations and large firms interested in developing trade in the French colonies, would be to collect supplies of children's clothing, preserved milk, flour and meal, etc. The committees would be represented in the respective colonies by an organisation which would be known as the Senegalese, Congo, Malagasy, and other Care Centres. These organisations would be very useful in supplementing the work of the doctors and midwives by distributing clothing and milk and by getting into touch with native mothers so as to give them advice and gradually to train them in the rearing of children.

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6. Circular of the Governor-General of French West Africa on the Epidemic of Relapsing Fever in the Soudan — Dakar, February 12th, 1923.

7. Circular of the Minister of the Colonies regarding the Measures of Health Protection to be applied in all Public and Private Workshops employing Native Labour in all the Colonies — Paris, July 22nd, 1924.

8. Circular of the Minister of the Colonies with regard to the Measures of Health Protection to be applied to Native Workers proceeding Abroad — Paris, October 14th, 1924.

9. Circular of the Minister of the Colonies and of the Minister of War concerning Health Measures in connection with the Transport of Native Troops — Paris, January 7th, 1925.

10. Circular of the Minister of the Colonies with regard to the Organisation of Aviation Health Services — Paris, October 21st, 1922.

11. Questionnaire addressed to the Governors of the Colonies with regard to Relapsing Fever (drawn up by Inspector-General Gouzien, delegate of French Indo-China at the Office international d'hygiène publique) — Paris, June, 1923.

See also :—

12. Practical Instructions for the Campaign against Malaria. *Bulletin de la Société de Pathologie exotique*, Volume 18, No. 3, 1925.

13. Note on the Prophylaxis of Sleeping-sickness. *Bulletin de la Société de Pathologie exotique*, Volume 13, No. 7, 1920.

14. Supplementary Note on the Prophylaxis of Sleeping-sickness. *Bulletin de la Société de Pathologie exotique*, Volume 17, No. 6, 1924.

Cochin-China has already made a start, and the Cochin-China Care Centre is in process of formation.

The need is most urgent, however, in Africa, and it is here that it is important to carry through the work at an early date. In this matter the Etienne Committee will be of the greatest use.

The Instruction of December 30th, 1924, was accompanied by an annex laying down the general rules to be followed in organising the campaign against the chief causes of depopulation and the deterioration of the native races.

Owing to the important part played by the administrators in carrying out the programme thus mapped out, it was thought indispensable not only to give these officials a fairly extensive knowledge of colonial hygiene, medical relief work and prophylactic and social medicine, but also from the outset to establish between them and the doctors ties of loyal comradeship.

Thus it was decided by the Minister for War that young administrators, after qualifying in the Colonial School, should, on leaving the cadet platoon for reserve officers, be attached to a colonial unit in the garrison at Marseilles. Here they complete their regular period of service, and during that period they attend special lectures at the advanced school of the Colonial Health Service delivered by the teaching staff of that establishment.

At the same time the requirements of Europeans had to be remembered, and the Department has endeavoured to improve and develop the medical resources at their disposal in the various French colonies, where the so-called General Service Hospitals and temporary stations, which are run by the personnel of the Colonial Health Service are open to civilians and soldiers and their families.

To keep these hospitals abreast of the progress made in modern medical and surgical therapeutics, and to give all Europeans on the spot the best possible treatment, the Minister for the Colonies ordered, in a circular of July 8th, 1924 that specialist services should be organised at the principal institutions to meet all requirements, and that emergency surgical services should be established in all sanitary areas situated in remote parts and lacking means of speedy evacuation.

An inter-departmental instruction framed by agreement with the Department for War fixed the conditions under which medical officers of the Colonial Health Service might, while in France, be given specialist training. It gave a list of these special subjects and fixed the length of courses at six months.

CHAPTER IV.

MEASURES AGAINST SOCIAL, ENDEMIC AND EPIDEMIC DISEASES.

The diseases which ravage the French colonies may be classified in three groups.

A. *Social diseases*, common to temperate and hot countries, which being of a permanent character and slow to spread, are to be reckoned among the most serious causes of depopulation. This group includes diseases due to bad environment, tuberculosis, leprosy, venereal diseases, etc.

B. *Endemic diseases*, occurring more particularly in the tropics, where they have taken a firm hold and where they are, so to speak, part of the general environment : malaria, dysentery, trypanosomiasis, trachoma, pneumococcus infections, etc.

C. *Epidemic diseases*, forming a complex group of diseases peculiar to hot countries and diseases common to all latitudes, which pass in sudden waves over the population. This class includes pestilential diseases (plague, yellow fever, cholera) for which special regulation is made by the Maritime Health Police.

A. Social Diseases.

1. *Diseases due to Bad Environment.*

By this term is to be understood disease arising from inadequate clothing, bad housing and insufficient food. The native has to be warned of the dangers to which he is exposed. He has to be *clothed*, so as to be protected from variations of temperature, which are sometimes the cause of bronchial and pulmonary troubles, and particularly pneumococcus infections, which work much havoc among the African populations and the Malagasies ; he has to be *housed* in sanitary quarters, protected from rodents which carry the germs of plague, and given sufficient air-space, since overcrowding leads to the spread of the germs of infection. Finally, he has to be *fed* in order to ensure his normal physical development, to increase his powers of resistance and to ward off diseases due to a lack of vitamines which, like beri-beri and scurvy, sometimes attack large sections of the population and military camps, prisons, etc.

In French Equatorial Africa, it is almost always the case that the blacks inhabiting the forests, who live almost exclusively upon forest products and are utterly improvident, are insufficiently fed. Accordingly

it is necessary to organise a definite policy to provide for their food requirements to exempt certain particularly poor races from taxation, to make the cultivation of food compulsory in proportion to the number of mouths to be fed, to establish model gardens, train advisers responsible for the distribution of seeds, etc.

Nitrogenous foods, meat or fish, are rare or almost unknown among certain tribes in the interior. It is therefore necessary to foster cattle-breeding and to develop native fisheries by showing the best ways of preparing and preserving fish, as has recently been done by a mission on the Niger.

Further, the French textile manufacturers are at present considering the question of cotton-growing in Africa and the introduction into Madagascar of sheep, which, it seems, could easily be acclimatised in certain parts of the island. Sheep farming for the woollen trade would constitute a valuable source of revenue for the natives.

The report submitted to the Academy of Colonial Sciences by Professor Calmette and M. Roubaud on the feeding of natives deals admirably with this question and is to be distributed for use in all the colonies.

2. *Alcoholism.*

Alcoholism, which is rare in Indo-China, is particularly widespread among the populations on the coast of Africa which come into direct contact with European commerce, in St. Pierre and Miquelon and in the old French West Indian colonies and Reunion, where the manufacture of rum is one of the principal industries. It is to the mischievous effect of alcohol that we must mainly attribute the poor physical quality of the contingents from Guadeloupe, Martinique and Reunion. In the last-named colony, for instance, the medical board of 1923 rejected 1,910 young men as being temporarily or permanently unfit out of 2,463 examined, that is to say, 77.57 per cent.

In French West Africa, the importation of trade spirit has already been forbidden (Decree of May 15th and Order of December 24th, 1921) ; high duties are imposed on other spirits. These measures are to be made general, while the disastrous practice of supplying rations of alcohol or making payments in alcohol are to be entirely suppressed.

Licensed premises are to be subjected to control, their number greatly reduced and the sale of wholesome non-spirituous beverages alone authorised.

3. *Venereal Disease.*

Among the branches of overseas medical work, the campaign against venereal disease must be given a foremost place. Syphilis and gonorrhœa take heavy toll not only of adults (40 per cent of cases treated in French

hospitals for chronic disease ; a third of the lunatics are syphilitics) but also of the unborn (miscarriages, still-births) and of infants (infant mortality). In the case of Europeans living in the tropics these venereal diseases often give a peculiarly malignant character to endemic disease.

The prevalence of venereal disease in the colonies has long been a familiar phenomenon, and as far back as the seventeenth century the East India Company warned its representatives in Madagascar of the peril. This colony is the worst sufferer ; the proportion of syphilitics is estimated at 75 per cent of the total population.

The statistics of lying-in hospitals over a period of eleven years (1909 to 1920) show a striking percentage of syphilitic infants, varying from 28.38 per cent in 1911 to 43.49 per cent in 1920.

In 1923 the number of cases of secondary syphilis had greatly increased, amounting to 10,976 compared with 4,342 in 1922 and 1,126 in 1921. This situation which, in view of the work already undertaken, reads like a paradox, is no doubt due to the fact that every day a larger number of persons visit the dispensaries and cases are therefore more easily discovered.

The West African colonies are less affected (55 per cent of the population). Venereal diseases were introduced by the Arabs, Berbers and Moroccans before the arrival of the French and carried as far as the banks of the Niger and Lake Chad, which explains why Central Africa is more infected than the coastal districts.

In 1903 the syphilis morbidity statistics among native Chad troops showed 144 cases out of 1,000 men, whereas among the native troops of French West Africa the highest figure for the same disease has never exceeded 16 per 1,000 (1905).

In Indo-China venereal diseases occupy the second place, coming next to malaria in the table of the principal diseases found among the natives. They are most prevalent in the Tongking Delta, in Annam and Cochin-China. The following are the figures given by the lying-in hospitals in Cholon and Hué for 1921 :

	Cholon Hospital	Hué Hospital
Number of confinements	1,196	930
Number of premature confinements . . .	95	128
Number of mortified fœtuses	90	92
Number of live-born children infected with hereditary syphilis	60	19

These diseases are also widespread in the Indies, Oceania, the Antilles (25 per cent of the hospital cases), etc.

In combating the venereal danger, the following have proved of great value :

(1) The dispensary supplemented by advice given to pregnant women in maternity hospitals ;

(2) Education of the population. This takes the form as far as possible of advice in the native tongues given by visiting doctors and by means of printed notices. Instruction is also given to contingents before joining their regiments [1] ;

(3) The diffusion of a knowledge of individual prophylactic treatment ;

(4) The organisation in trading ports of special services for giving medical advice to sailors on ships putting in at these ports.

At Dakar an anti-venereal dispensary is attached to the Institute of Social Hygiene, but the campaign is best organised in Madagascar. In 1923, 49 dispensaries had been opened and the number is to be still further increased. At Antananarivo these dispensaries gave 25,086 consultations, necessitating 8,334 injections with arsenic, 8,234 injections with mercury and 14,068 treatments with iodide.

All medical students on leaving the medical school must complete a period of service in the dispensaries. Of these one is close to the Malagasy Red Cross Crèche, which receives 1,500 to 2,000 children every week.

The training of several syphilis specialists will soon make it possible to extend the campaign against the venereal danger sufficiently to meet requirements.

4. *Tuberculosis.*

Tuberculosis is rife in all the colonies. Common among the Hindus and Annamites, it appears, in Indo-China, to have spared Laos and Cambodia. In Madagascar, it is prevalent among the Hovas of the high plateaux and much less common among the coastal populations. In French West Africa and French Equatorial Africa, only a few isolated cases in the interior of the country have as yet been reported, in spite of the continual introduction of tuberculosis germs. In the old colonies—Reunion, the West Indies, Guiana—tuberculosis has developed together with civilisation.

Its manifestations are more acute and serious when they occur on virgin soil, and they are more chronic and less severe where the race has been more thoroughly infected and over a longer period. This proves that the inhabitants of an infected area become gradually immune.

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[1] Indo-China has already spent 15,000 francs on medical films which are shown three times a week to schools. Cochin-China has devoted 8,000 francs in its budget for the production of instructive local films.

The campaign against tuberculosis was inaugurated on the most practical and scientific lines by the Pasteur Institute at Saigon in Cochin-China, and may serve as a model for all future organisations. Put briefly, the action taken was as follows :—

A. In order first to ascertain the prevalence of the disease, skin reaction tests with tuberculin were applied to different groups :—

(1) Out of 2,916 persons of varying social standing and of different ages up to 20, the percentage obtained was 67, a figure very close to that recorded in Europe.

(2) Out of 5,707 school-children in the town or province of Cholon, the average was 49.30 per cent, which coincides with the figure for France.

B. The Laboratory for the Study of Tuberculosis has an equipment which allows of the rapid discovery of infectious cases in communities or families, through the stethoscopic examination of patients, the search for the Koch bacillus in sputa and stools, through the inoculation (after homogeneisation and centrifugation) of laboratory animals with any suspect matter found, the radioscopic and radiographic treatment of patients, by sero-diagnosis and finally the search for and titration of tuberculosis antibodies in the blood.

C. The public is instructed in matters of health by propaganda pamphlets published in French and Annamese for the purpose of disseminating a knowledge of tuberculosis and its prophylaxis. These are summarised and translated in native newspapers, and discussed by teachers and public men with their pupils or subordinates, etc. ; lectures with propaganda films are given by the provincial doctors ; notices are posted up in offices, barracks and public places, setting forth the elementary principles of health.

D. The protection of persons liable to the disease and the care of children are ensured at Cholon by a municipal committee for the study of tuberculosis, which, after the school-children are examined by experts, takes the necessary financial and social steps to look after suspected cases by sending them to open-air school, sanatoria or hospitals and by taking precautionary measures in respect of parents or contaminating agents with which the children come into daily contact.

Lying-in hospitals, crèches, infant welfare centres, anti-tuberculosis inoculation, together with the publication of pamphlets on infant mortality, supplement and complete the measures taken on behalf of children.

E. Pending the establishment of special hospitals, should they prove necessary, the treatment of tuberculosis cases and the isolation of germ-carriers are being undertaken, in hospitals, in special wards adapted to the various stages of the disease.

Finally, the construction of seaside and mountain sanatoria is contemplated and will be proceeded with shortly, as soon as experience has shown the best places to choose.

Furthermore, inoculation against tuberculosis with CALMETTE's B.C.G. vaccine has been tried in Cochin-China on infants of a few days old, and in West Africa not only on infants, but also on soldiers showing a negative skin reaction who were bound for service in France and with the expeditionary forces, where they run the risk of contracting the most serious forms of the disease. This shows the immense advantages which inoculation would confer, should experience confirm its efficacy, and the beneficent influence it would have in keeping up the strength of the troops.

These experiments have been entrusted to the laboratories at Saigon and Dakar, which have been supplied with vaccine germs by the Pasteur Institute in Paris, and will prepare the vaccine on the spot in strict accordance with the directions of that institution.

5. *Leprosy.*

Leprosy is found in all the French colonies ; the total number of lepers may be estimated at 40,000 to 50,000 in a population of about 57 millions.

Although leprosy is not very infectious, it is greatly feared by reason of its repulsive lesions. Sufferers from this disease, being in fear of permanent internment in leper hospitals, make every effort to hide their disease and escape all supervision.

The Third International Leprosy Conference, which met at Strasburg in July 1923, emphasised the necessity for abandoning the mediæval methods of coercion in favour of a system which, while offering full guarantees to public health, is more humane from the point of view of the lepers themselves and holds out better prospects for their successful treatment.

As a result of the work done by ROGERS in Calcutta and by HOLLMAN and DEAN in the Hawaiian Islands in connection with Chaulmoogra ethers, the treatment of leprosy has entered on a new phase. The success claimed by these scientists appears to have received fairly strong confirmation in some of the French colonies, and there is reason to believe that the new treatment will attract lepers to the dispensary to be dealt with in the same way as syphilitics. They will be regarded as infectious, and placed in one of the following categories :—

(1) Lepers showing no open lesions nor throwing off bacilli, and therefore either not yet or no longer infectious. Hospital treatment would only be necessary in the case of patients living far from the dispensaries ; all others would come for advice and injections to the dispensary and would continue to lead their normal lives.

(2) Lepers suffering from open and therefore infectious leprosy. These would be isolated in hospitals in a special ward and treated until the lesions throwing off bacilli were cicatrised or sterilised ; they would then return to their families or resume their ordinary occupations, but would be compelled to undergo further curative treatment from time to time and to submit to examinations to prove that they were still free from infection.

(3) Mutilated and disabled lepers, who should be placed in homes. The treatment provided in the two foregoing stages would, of course, have the effect of reducing the number of cases in this category.

Another very necessary precautionary measure is to separate the children of lepers from their parents as soon as possible so as to protect them from infection. In this way one of the principal sources of the scourge would be removed.

There are at present :

1 leper hospital at Pondicherry ;

17 leper hospitals in Madagascar with accommodation for 3,433 lepers ;

2 leper hospitals in Guiana (one at Acaruany for 50 to 60 cases and one on the small island of St. Louis, for convicts) ;

14 leper hospitals or leper villages in Indo-China with 5,899 cases ; 7 in Tongking with 3,108 patients ; 1 in Annam. It is proposed to establish two others (one at Culao-Rong for Cochin-China ; one at Troïng in Cambodia).

The total number of lepers distributed throughout French West Africa is estimated at about 15,000 ; six leper hospitals and six leper villages have been organised in the Cameroons (1,189 interned lepers).

Leprosy is rife in New Caledonia. About 60 leper hospitals, divided according to districts, are working under the supervision of colonial doctors. A central leper hospital, established on the peninsula of Ducos, near Noumea, receives all lepers of different races who cannot be isolated in the place where they live. Separate leper sections have been established at this hospital for Europeans, natives and convicts [1].

There is a leper hospital at Tahiti (the Orofara Hospital) and one in the Marquesas Islands (the island of Hiva-Oa with 33 lepers) with an isolation village.

In Martinique lepers are interned on the little island of Désirade.

Recent instructions from the Department insist upon the necessity of developing the services for detecting leprosy by employing doctors specially

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[1] This question is dealt with in full in Part 2.

trained at courses given in the hospital of St. Louis and the Pasteur Institute in Paris.

Such services are already at work in New Caledonia, and two doctors, at present attending courses, will organise similar ones in Madagascar and French West Africa.

B. Endemic Diseases.

1. *Malaria.*

In most of the colonies, and particularly in Indo-China and Madagascar, malaria is the main cause of depopulation. According to Indo-Chinese statistics, more than 16,000 cases are dealt with by the health establishments, but these only represent a very small proportion of the total morbidity. Malaria is especially severe in the forest districts of Tongking and Annam, in the zone between the plain and the last spurs of the Annamite chain, where the inhabitants are physically so wretched as to have earned the name of " swollen " Annamites (*bouffis de l'Annam*). Parasitic complaints (especially hookworm) are also partly responsible for this organic decay.

In Madagascar the 1922 figures showed that malaria was responsible for nearly one-third of the morbidity among Europeans and for nearly a quarter of the general morbidity among the natives. At the last enlistment of men for the army, between 2.70 and 31 per cent of the men were refused on account of chronic malaria and enlarged spleen. Malaria is more prevalent on the high plateaux, especially among infants ; it is hard to deal with because the haunts of the anophelos are frequently the rice-fields cultivated by the inhabitants, and these breeding-grounds could not be removed without causing famine.

In West and Equatorial Africa, malaria is less common among adults, but children are attacked up to a proportion of 80 per cent in some areas, as is proved by the malaria index, that is to say, the relation in a district between the number of healthy children and the number of children suffering from the disease.

In Reunion, the Eden of the old navigators, malaria at present accounts for one-third of the total morbidity figures and about seven-tenths of the deaths ; 87.62 per cent of absences from schools are due to this cause.

Unknown in New Caledonia, malaria is rife in the New Hebrides, even in the form of hemoglobinuric fever.

The campaign against malaria has been carefully worked out and its prophylaxy is represented by the equation : Malaria = anopheles + virus centres.

Recourse is had both to direct methods, which consist in an attack upon the inoculating agent itself with a view to destroying it in the course

of generation (anti-larval measures on a large and small scale) and indirect methods, the object of which is to protect the individual against bites from the mosquito (mosquito nets, wire-netting, protection by cattle, etc.) or to render the bite harmless (sterilisation of the virus centres).

Unfortunately these methods, excellent though they are in principle, are often exceedingly difficult to apply in practice over immense areas like Western and Equatorial Africa, or in countries like Madagascar with stagnant waters and terraced rice-fields. They must be applied with great care, and at every failure malaria infection is likely to reappear in the place from which it was thought to have been expelled. It must therefore be recognised that what really keeps a district in a state of permanent healthiness is its economic development, the proper cultivation of its soil, the density and general well-being of its population, and observance of the rules of hygiene in homes and among villages, etc.

The malaria problem differs also in each particular district with the climate (tropical, sub-tropical or temperate zone), the geology, the education of its inhabitants in health matters, the number of doctors, the financial resources, etc.

In all colonies the following measures are taken against malaria :—

(1) Small scale anti-larval measures oiling of stagnant waters, introduction of mosquito-eating fish, planting of trees with highly absorbent roots, such as the eucalyptus, bamboo, filao, etc.) ;

(2) Large scale anti-larval measures, involving agricultural engineering work (draining and warping of the marshes, cutting-down of weeds on the banks of streams, connecting-up marshes with the sea, alternate irrigation and draining of ground in accordance with the zone and increase in number of live-stock, protecting screen against mosquito-bites, etc.) ;

system introduced by the SERGENT brothers ; cultivation of the marshy

(3) Sterilisation of the virus centres by the use of quinine ;

(4) Prophylactic quinine treatment ;

(5) Individual or collective measures of protection against the mosquito (mosquito-nets, wiring-in of houses).

In order to place quinine within the reach of all and to make its use general, a Decree of May 16th, 1909, authorised Governors to take all necessary measures to extend its free distribution and its sale at a low price. But this is not easy owing to the rise in price of the various quinine salts during the last few years.

In Italy, where deaths from malaria have been much reduced, the annual consumption of quinine exceeds 24,000 kilos ; in Sardinia alone it is estimated at 8 grammes per head of the population per annum.

On March 20th, 1925, M. GOUZIEN, Inspector-General of the Health

Service, submitted a remarkable paper on the " Question of Peruvian Bark in the French Colonies " to the Academy of Colonial Science.

The quinine purchased by the Department can only give a very imperfect idea of the amount of alkaloid required by the various colonial governments. These purchases amount to about 4,535 kilos, representing 2.500.000 francs, basic hydrochlorate of quinine costing at the present time about 500 francs the kilo. To these purchases made in France, however, must be added those effected in the colonies themselves, making a total which must amount to more than 2.5 million francs.

The quantities bought are limited by the financial resources available and are far below the requirements of the malaria services. Thus it has been estimated that, if each inhabitant of French West Africa were to receive preventive quinine treatment for four months—reckoning a daily dose at 0.25—the cost would be 18 million francs, whereas the total budget of the health services is scarcely 12 millions (Rigollet). For Reunion the figure works out at 1,837,500 francs, reckoning the dose per inhabitant for one year at 25 grammes. In Madagascar, and for *Emyrne* alone, Couvy estimated the quantity of quinine required to treat 1,000 children for the four bad malaria months, at 26 kilogrammes, which is equivalent to 13,000 francs.

If all the *actual* requirements of the French and other colonies in quinine were to be satisfied, the total world production of the alkaloid would probably be insufficient to meet the demand. The production of the Dutch East Indies, the main source of supply, has been as follows :—

1921	513,604 kilos
1922	534,545 "
1923	534,524 "
1924	620,800 "

Java has a soil and climate specially suitable for the cultivation of the *Cinchona Ledgeriana* (named from Ledger, an Englishman, who sold it to the Dutch), which is the richest in alkaloid. Labour is plentiful in Java and transport conditions favourable.

It is therefore of the utmost importance for France to find suitable places in her own possessions for growing cinchona and to inaugurate a real quinine policy which will make her independent of foreign countries.

The conditions for such cultivation are the following : a warm, damp climate, with a constant temperature at an altitude of 1,000 to 1,800 metres ; the ground must be sheltered from the wind and not directly exposed to the sun's rays ; a soil of mixed silicon and clay, rich in vegetable mould, not too porous, not allowing water to stagnate, and preferably volcanic.

Experiments have already been carried out in various French colonies. In 1865, Dr. Vinson tried in Reunion to plant the *Ledgeriana* variety of the

C. Calisaya (yellow cinchona), the *C. succirubra* (red cinchona) and the *C. officinalis* (grey cinchona). Experience subsequently showed, however, that the bark on analysis yielded less quinine than in Java, while its treatment required the use of much dearer labour.

In Madagascar in 1922, some 10,000 cinchona trees were planted by the Agricultural Services in the experimental garden at Nanisana on the Antananarivo plateau. As the bark can hardly be collected for some four years, the results of this experiment are not yet known.

In Indo-China cinchona was first grown experimentally in Cochin-China in 1886, and in Tongking in 1887 by Paul Bert. These efforts were abandoned owing to the unsuitable climate and the unfavourable soil.

In 1918 Yersin made a similar attempt in Annam on the " Annamite Cordilleras ", where the geographical and geological conditions appeared favourable. It is not yet clear what results have been obtained, but the plants seem to have perished, their roots having been destroyed by parasitic fungi.

Nevertheless, it would appear desirable to organise prospecting parties in all the French colonies in order to discover ground suitable for the growth of the cinchona.

At Antananarivo the preventive treatment of malaria is a question of agricultural engineering and cultivation. It requires the execution of elaborate works estimated at 8 million francs. The filling-up of ponds and small scale anti-larval measures have already improved health conditions in certain parts of the town.

In the province of Itasy, the French endeavours have already had a most striking effect upon the demographic situation. The number of deaths in the province during the four worst malaria months, March to June, fell from 1,192 in 1923 to 769 in 1924, an improvement of 423 on former years, or 35 per cent.

The reduction in infant mortality has been remarkable ; in March 1924, 83 deaths were recorded and in April 74 as compared with 116 and 124 in 1923.

In West Africa the measures taken to destroy the anopheles led to the Decree of 1905 for the removal of stagnant water, and to the supplementary Decree of 1912. The anti-mosquito measures applied at St. Louis, Konakry and Grand Bassam have had good results. Those taken at Dakar, Kayes and Bamako were less successful owing to the topography of these localities, where the draining of the ponds is a difficult and expensive undertaking. A commission which met at Dakar on December 20th, 1923, drew up a new programme for improving the health conditions of the town, and indicated in the order of its urgency, the work to be carried out.

2. *Dysentery.*

Dysentery, and more particularly amœbic dysentery, has diminished in most of the French colonies. In Indo-China, where it is most prevalent, it now accounts for only 4,653 of the cases appearing annually in the hospital statistics. In Cochin-China the annual number of deaths from abscess on the liver, which sometimes amounted to 50, has now fallen below five. Amœbic dysentery is often complicated by bacillary dysentery.

This diminished destructiveness of the amœba is due above all to the efficacy of the new forms of treatment, to improvements made in the water supply and to the filtering systems which have been installed in the more populous centres ; the disease therefore is more prevalent in the less protected villages. Much work still remains to be done in order to provide the larger communities with drinking-water, for, as is generally known, many diseases are caused in the tropics by water ; diarrhœa, cholera, typhoid fever, intestinal parasitism. After purifying the water, the next urgent step will be to consider the best methods of evacuating stagnant waters and the means of getting rid of refuse and dirt, especially by the use of incinerators. The system of biological purification installed in the Hanoi hospital and the Puech and Chabal sand filter at Hué are entirely satisfactory. There are a large number of incinerators in Cochin-China ; these will shortly be replaced by the most up-to-date installations. Madagascar has just purchased a number of ovens (Clichy model) for the destruction of refuse.

Finally, the dispensaries and the various health establishments are helping to discover and sterilise germ-carriers, who not only spread their parasites among the native population, but introduce them into areas where the diseases to which they give rise have been hitherto unknown.

3. *Sleeping-Sickness.*

Sleeping-sickness is exclusively an African disease. It is uncommon in West Africa and only found here and there among the Lobi and Mossi tribes. Trypanosomiasis is most widespread in the Cameroons, where it has invaded the basin of the Doumé and the Upper Nyong. The endemic index among the inhabitants of some of the villages will furnish an idea of the gravity of the situation : Akonolinga 14 per cent ; M'Voké 14 per cent ; Bertona 25 per cent ; Bengalou 34 per cent ; Betougou 40 per cent ; Sidiam 54 per cent.

Dr. Huot, who has spent a great deal of time in this area, makes the following statement with regard to these foci of trypanosomiasis :—

" . . . In all seriously infected areas, centres of highly virulent epidemic outbreaks, we have always found that the underlying causes

lay in the disturbed conditions of life, a state of anarchy more or less complete, the abandonment of regular villages and the scattering abroad of the inhabitants, who live a semi-nomadic life in brushwood camps which are continually being moved and round which they hastily grow their meagre crops. These movements of population are not caused by disease and a desire to escape infection, as we at first supposed. In all the seriously infected places which we visited, political disorganisation due to various causes (exactions by native chiefs, rivalry of races, native turbulence of certain tribes, non-payment of taxes or levies) had preceded epidemics of trypanosomiasis, and were the real cause, and not the consequence, of these outbreaks. The native, leading an unsettled existence in a state of more or less open rebellion, living precariously in hostile camps, and constantly called out to meet a threatened attack, had lost the habit of productive work and cultivated the ground carelessly and unprofitably. The result has been serious under-nourishment and a rapid physical deterioration of the race, which is, in our opinion, the pre-condition of the development of violent epidemic outbreaks of trypanosomiasis, those sudden outbursts which give the disease the character of a devastating scourge. "

In French Equatorial Africa, sleeping-sickness does such havoc as to threaten the future of French colonisation ; it is widespread over all territories situated south of Lat. 9° N. (Fort Archambault).

In the Gabon, in the district of the Upper Ogôué, the Mindumbu-Bacanigins, the Baveumbenas, the Mindassas and the M'Bahuins furnish 10 per cent of sleeping-sickness cases ; the Awandjis on the Lékéry, 15 per cent ; the Bandjabis and Baketas 35 per cent ; and, finally, the Batchanguis in Upper Libumbé, 50 per cent. The invasion of these districts by sleeping-sickness has had disastrous results ; Saiak, which formerly had an administrative post and a factory, is to-day nothing but a desert.

In Upper Shari (Ubangui), a prophylactic campaign undertaken in 1921 by Drs. Boyer de Choisy and Allègre led to 101,195 natives being visited and examined and to the discovery of 4,518 cases of sleeping-sickness, giving a coefficient of 4.4 per cent. The five subdivisions of Marali, Crampel, Bambari, Buka and Dekoa are specially affected.

In Ibenga-Motaba, Dr. Delinotte examined 51,679 natives and found among them 2,996 cases of sleeping-sickness.

In the sector of Fort Archambault (Upper Ubangui) 227,772 examinations have been made, and 12,618 cases of sleeping-sickness discovered.

In 1920 Dr. Muraz reported the results of his investigations, which gave the following percentages for a number of villages :

	per cent.
Guera (Middle Shari).	50.90
Pullu (Middle Logona)	90.00
Bahra (Middle Logona)	35.71
Bakongo (Middle Logona) . . .	48.03
Choa (Mayo-Kebbi)	54.58

These few figures sufficiently indicate the ravages of sleeping-sickness.

The campaign against trypanosomiasis began in 1906 with the mission which was organised by the Pasteur Institute and the Geographical Society and led by Dr. Martin, assisted by Dr. Leboeuf and M. Roubaud. This mission of investigation and research laid the foudations of the prophylactic treatment of sleeping-sickness. The methods of attack and defence are now well known ; the infected territories are divided into sectors (decree of the Governor-General of French Equatorial Africa dated January 22nd, 1921), to each of which is posted a mobile sanitary detachment. This detachment is in the charge of a doctor and its special duty is to discover cases and then apply prophylactic measures of three kinds—*therapeutic*, *administrative* and *economic*.

The first are the most effective. These consist in destroying for a shorter or longer period the trypanosomes in the peripheral blood by means of an arsenical salt, atoxyl or aminophenylarsenate of soda (six separate injections at intervals of ten days). In order that atoxylisation may be effective, it must be applied as soon as the outbreak occurs. This necessitates discovering sleeping-sickness cases as speedily as possible.

Economic prophylaxy consists in clearing the cuttings through the forests, the water-courses and frequented pathways (outskirts of villages, watering-places, places where wood is cut, fords, mooring-places), where the tsetse fly is mainly found, and, as regards individual measures of prophylaxy, in the wearing of putties and white clothing, the lighting of fires in the camps, the use of mosquito-nets and the covering of cabins on river steamers with wire netting.

Administrative prophylactic measures. — Collecting native communities, scattered in the equatorial forests around easily accessible means of communication ; the sector doctors can then visit them frequently.

Re-settlement, if necessary, of whole villages ; control over the movement of natives, the recruiting of labour and recruiting for the army.

Improvement of the food supply by encouraging the import of meat, especially preserved meat, and by altering the methods of fishing in rivers and the preparation and transport of dried fish, and by seeking to obtain for the inhabitants the maximum of prosperity.

Compulsory inspection, with a view to discovering trypanosomiasis, of all persons leaving the colonies (Decree of August 6th, 1920). Should

an infected case be discovered, the person in question receives a sterilising injection of atoxyl and is subjected to the sanitary passport system.

Since 1923 Parliament has every year devoted a million francs to combating sleeping-sickness, but it must not be forgotten that the work to be done is very heavy. French Equatorial Africa has an area four times as large as that of France, and, owing to the shortage of doctors, the size of the prophylactic areas is still considerable, exceeding that of many French Departments. That being so, the duties of the medical officer of the sector can be imagined. He must be essentially mobile, undertake long tours, take a census of the natives, diagnose cases, effect their isolation and the sterilisation of the virus centres by atoxylation. Travelling is done in tipoys, on horseback, in canoes or by boat, and occasionally by motor-car.

In the unhealthiest parts of the tropical forest, therefore, this travelling prophylaxy demands from those who undertake it the qualities of the genuine apostle, and hitherto the missionaries of this humanitarian crusade have been recruited exclusively from among the doctors of the Colonial Health Service. In spite of all the difficulties, however, important results have been obtained. In 1922 seven prophylactic centres were working and 680,958 persons were examined. Of these 30,323 were found to be suffering from trypanosomiasis and treated with atoxyl. In 1923 20,032 cases were recorded ; at the end of 1924 the increased number of doctors made it possible to bring up the number of sectors to 10 ; there are now 12.

On the initiative of the Department, active encouragement has been given to the Colonial Public Health and Relief Services. A young and active medical inspector, with special knowledge of Equatorial Africa and sleeping-sickness, has been appointed head of the Health Service. Gradual improvements of pay have been provided for the Sector Medical Officer, who will also be recommended for the Legion of Honour.

The number of doctors has been raised from 27 to 42, and, as means allow, the number will be gradually increased until it reaches 50.

From now on the doctors and the Administration should be able to work in the closest touch.

4. *Trachoma.*

This disease is particularly widespread in Indo-China. It is calculated that in the Tongking delta 50 to 70 per cent of the inhabitants are suffering from it and that half the blindness is due to this serious infection, which in this country assumes the character of a positive social scourge. In some parts of Southern Annam, the trachoma index is 85 per cent.

Other colonies suffer more or less seriously from granular conjunctivitis. In Equatorial Africa, the complaint becomes more frequent inland. Sand is still a contributory factor and trachoma is probably transmitted to the natives by caravans coming from North Africa, which are notoriously

infected and which remain for a longer or shorter period in the native villages.

Trachoma is common in French Somaliland, uncommon in Madagascar.

It is hard to combat, because infection is mostly spread among children and in the family. In Indo-China, however, a systematic and active campaign has been set on foot. Ophthalmological clinics have been established at Hanoi, Hué, Cholon and Pnomh-Penh. These clinics send trachoma detachments into the interior of the country in the charge of native assistant doctors who have been trained at the School of Medicine at Hanoi. Each year they travel through the different districts to discover cases, organise treatment and carry out the necessary prophylactic measures.

During 1923 the statistics of the Opthalmological Institute of Hanoi recorded the following results :

Consultations	10,712
Hospital cases	775
Days' treatment	12,926
Operations	712

The prevention of trachoma among school children is making progress in Indo-China : in 1923, 10,800 tubes of camphorated copper pomade were distributed.

5. *Pneumococcus Infections.*

These are common among the blacks of West and Equatorial Africa and the Malagasies, and are caused by insanitary conditions and inadequate clothing. They sometimes assume an epidemic character.

Borrel estimated the pneumococcus death-rate among native recruits at 5 and 6 per cent during the first year following enlistment, adding together for this purpose the losses incurred in Senegal (concentration camps) and in France (period of acclimatisation). After that period the men seem to have acquired, as a result of attacks of varying intensity, definite immunity against the pneumococcus, and are thus able to face the hard winter in France.

This suggested that attempts should be made to obtain this immunity artificially by inoculation. The laboratories at the Pasteur Institute have been instructed to prepare a vaccine with local strains of pneumococcus, and the contingents are to be vaccinated before leaving the colony so that they may be in the best possible condition to withstand infection.

Pneumococcus infection, with its cerebro-spinal complications, is prevalent on the high plateaux of Madagascar (Emyrne, Betsiléos). Every native is a carrier of pneumococci, which, owing to the scanty clothing of the natives and the complete absence of sanitation in their houses, act during the cool season with special virulence on constitutions already

weakened by malarial infection. The Malagasy of the bush dresses summer and winter in a simple *lamba* and lives in huts from which light and air are entirely excluded and where the domestic animals live side by side with the human occupants. Infection is easy in these crowded hovels, where all the members of the family lie down and sleep huddled together to protect themselves from cold.

These deplorable but deeply ingrained habits will be difficult to eradicate ; only time and patience will do it.

C. Epidemic Diseases.

1. *Smallpox.*

The inevitable reduction in the number of smallpox vaccinations during the war resulted in the reappearance of this disease in a number of colonies. Nevertheless, the vaccination services have gradually been reconstituted as European personnel increased and as it became possible to employ an ever larger number of native assistants.

In Madagascar a smallpox epidemic broke out in 1922 in the Grandes Comores, and in the face of the danger the number of vaccinations and re-vaccinations increased, rising during 1923 to 453,644.

In the French Indian settlements, smallpox causes 300 to 1,200 deaths annually, although vaccination is systematically organised. Unfortunately the people show very little desire to resort to this treatment, smallpox being regarding in certain Hindu castes as a blessing from the gods.

In West and Equatorial Africa, epidemic outbreaks were reported in 1923 in Dahomey, Upper Senegal and Niger, the Middle Congo, in the Chad territory and in Ubangui-Shari. There was also an outbreak in Indo-China, where the recrudescence of smallpox was part of a general epidemic movement which spread over the whole of the Far East.

The vaccination figures in the principal colonies are as follows :—

West Africa	1,300,000	4,965,783
Equatorial Africa . . .	57,000	
Cameroons	35,000	
Indo-China	3,120,139	
Madagascar	453,644	

A circular from the Minister for the Colonies dated April 17th, 1923, emphasises the necessity of increasing the number of native vaccinators and of having recourse to dry vaccine in perfect preservation when there is no glycerinated lymph of proved efficacy. At the same time, it is desirable, in spite of its power of resistance, to preserve the dry vaccine against unnecessary overheating, and the use of a metal thermos furnished with a freezing mixture is recommended.

2. *Cholera.*

Cholera continues to appear in epidemic outbreaks both in the Indian Settlements where the annual death rate is between 500 and 2,000, and in Indo-China, where, since the deadly epidemic of 1910 (20,000 fatal cases), the annual average number of deaths is still 2,000 or 3,000.

At the same time the disease may be regarded as on the decline, owing to the increased prosperity of the inhabitants, a more active supervision of drinking-water and the institution of remarkably effective cholera inoculations ; these have so far gained the confidence of the natives that, on the occasion of a recent recrudescence of cholera at Phnom-Penh, the King of Cambodia himself was one of the first to be vaccinated with all his family.

In 1916, at the time when the recruiting of labour for France was being actively pursued, a few epidemic outbreaks of cholera appeared in the concentration camps and on board the transports. The situation was becoming critical when Dr. Gauducheau succeeded, by means of a local vibrion strain and an improvised installation, in manufacturing vaccine on the spot in sufficient quantities to inoculate all the infected detachments. The epidemic was thus stamped out in a few days.

Since that time this vaccine has been manufactured on a large scale at the Pasteur Institutes and laboratories in the colony.

The number of vaccinations during the last few years is as follows :—

1919	100,415
1920	42,330
1921	127,361
1922	76,761
1923	19,587

3. *Relapsing Fever.*

This disease has been reported in West Africa and Indo-China.

It appears to have been imported into the Sudan in 1921 by native soldiers who came from foreign theatres of war and were repatriated via Guinea and Upper Niger. This opinion is corroborated by the fact that the spirocheta found in the blood is Obermeier's (European relapsing fever) and not Dutton's (African relapsing fever). However, other observers attribute this epidemic to the renewed activity of a local virus.

The epidemics in the Sudan have been most deadly (from May 1921 to March 1923 there were 108,700 cases including 19,300 *deaths*). The actual progress of the epidemic is described in Part 2.

In 1906 Obermeier's spirocheta was discovered in Indo-China by Dr. Yersin in the blood of coolies working on the South Annam railway. It has also been found in Tongking in the provinces of Bac-Giang, Hai-

Duong, Nam-Dinh and Bac-Ninh. Since 1914 only a few cases have occurred.

The prophylactic treatment of relapsing fever is contained in these two formulas : sterilisation of patients, who are the virus reservoirs, by arsenobenzene ; destruction of lice, which are the carriers of the germ.

As it is a difficult and very costly matter to sterilise all cases, efforts must be mainly concentrated on the louse.

Delousing stations have been established in the interior of the country at all important points and on each side of the land frontiers separating the African and Asiatic colonies from one another.

In addition to fixed installations for destroying lice, which can only be set up in well-organised centres, it will be necessary to provide mobile detachments to work in the bush, taking with them rough and ready sterilising material such as the bag and the siphon of sulphurous anhyride as used by Dr. Raynaud in Algeria.

The sanitary measures against relapsing fever must be strictly applied owing to the hereditary transmission of infection in the lice and its stubborn resistance to destructive agents.

4. *Yellow Fever.*

This disease, which formerly worked great havoc in Africa, Guiana and the Antilles, now seems to be almost extinct, and only appears in a few epidemic outbreaks, of which the latest was in Dahomey, where six cases occurred. Moreover, it was in all probability imported into this colony from the British Gold Coast, where it lies dormant in an endemic state. In view, however, of the violent and serious nature of these epidemics, yellow fever must continue to be the subject of most careful measures of control.

As infection is carried by a mosquito, the *Stegomyia Calopus*, yellow fever prophylaxy must consist in seeking entirely to destroy the mosquito at all stages of its development, and to protect man from the sting of the adult insect.

Accordingly, all measures taken by health experts against the malaria-carrying mosquito (anti-larval measures, destruction of the insect, protection against its sting, etc.) will apply to the *Stegomyia*, the only difference being that the latter is more delicate and that the female does not breed when the temperature is over 20° ; a temperature of 39° is fatal to it. Between 14° and 18° the insect does not sting. Thus the endemicity of yellow fever is included within the zone lying between the isotherms of 20 degrees on each side of the Equator. Industrially this is a point of some importance, for, if it were found possible in the tropics to cool a house in which yellow fever patients were isolated down to about 15°, we

should succeed in preventing infection without having to resort to the use of wire netting.

As soon as a case of yellow fever is reported, the patient is immediately isolated, if possible on the spot, in a building protected from mosquitos by wire netting. The houses in the neighbourhood are then cleared of mosquitos by sulphur or pyrethrum powder.

Anyone leaving the locality has to be in possession of a health passport, to remain subject to medical supervision for six days after his departure, to have his temperature taken twice daily and to be isolated at night in a netted building.

In exceptional circumstances, of which the health authorities are the sole judges, persons may be kept under observation, and this necessitates internment.

Baggage belonging to patients is disinfected if it is considered capable of conveying live mosquitos.

Under normal circumstances the quarantine is three weeks, but this period may be shortened if the temperature falls or the Stegomyia become notably fewer.

5. *Plague.*

In Indo-China, plague was reported for the first time at Nha-Trang (Annam) in 1898, having been imported in Chinese junks. Through the development of trade relations between Yunnan and Kwang-Si, it took root in Tongking in 1900. It has since become endemic throughout the whole colony.

Madagascar was also infected in 1918 by a vessel laden with rice from India. Plague is rife at Tamatave, Diego-Suarez, Majunga and Antananarivo, where it appears in the most severe forms of septicæmia and pneumonic plague.

It has been twice recorded at Reunion, in 1899 and 1900. New Caledonia was infected by way of Sydney in 1899, but since 1905 has been almost immune.

The Indian Settlements appear to have suffered only one serious outbreak at Chandernagore (200 deaths); the territories of Pondicherry and Karikal have remained entirely free.

Foci of endemic plague have formed themselves in West Africa since 1914. First localised at Dakar, it spread into the interior, claiming altogether 3,886 victims in 1914, 544 in 1917, and 2,823 in 1918, and, since 1919, 4,370, 5,765, 1,240 and 650 deaths in the successive years.

The disease was energetically dealt with and is obviously declining. In 1924 the number of deaths in Senegal was a sixth of the 1919 figures, and in Indo-China the plague morbidity and mortality figures have fallen

50 per cent in the last three years. In Madagascar the statistics show 790 cases, including 673 deaths, between June and December 1924.

The prophylactic measures against plague employed in the infected colonies may be summarised as follows :—

(1) Protection of the inhabitants from patients and persons suspected of being infected. Discovery of early cases, necessitating close co-operation between the health bureaux, the doctors responsible for furnishing death certificates, the personnel of the registrar's offices and of the detection services ; bacteriological examination of captured rodents.

Isolation of patients ; disinfection, evacuation and even destruction of infected premises ; application of the health passport system ; preventive vaccinations and injections with serum.

(2) Protection from goods coming from infected areas. Establishment of sanitary cordons ; supervision of railways, stations, markets, etc., through which goods pass in transit.

(3) Protection against the rat, which is the virus centre, and its fleas, which carry the Yersin bacillus.

Such are the most effective measures, for it may be said that the gravity of the epidemic is in proportion to the number of rats. The destruction of rodents must be effected by all possible means : terriers, traps, poisoned paste, rewards for captures, asphyxiating gases (chloropicrine), etc.

As rats feed on organic refuse and grain stored in warehouses, the sewage services must be carefully supervised. Refuse must be transported in air-tight receptacles. Wire netting will be placed at all the outlets from buildings serving for the storage of cereals. The floors of native houses will as far as possible be cemented ; walls of mud and bamboo which serve to shelter rats will be gradually replaced by brick walls.

Vaccination has not hitherto provided a very valuable remedy, and the population should only be advised, and not ordered, to submit to inoculation. In any case immunisation by the Haffkin method does not justify the doctor in dispensing with any of the other preventive measures which we have just mentioned.

6. *Cerebro-spinal Meningitis.*

Cerebro-spinal meningitis, which was recorded in Senegal by Marchoux in 1899, seems to have taken root in the military territory of the Niger (French West Africa), where its appearance dates back to 1921. It was on February 28th, 1921, that the Colonel in command of the territory of the Niger was warned by a telegram from the Governor of British Nigeria that an epidemic of cerebro-spinal meningitis had just broken out among the natives of the Sokoto district, which borders on the main route from Niamey

to Zinder. The epidemic had really begun in November 1920, and suspicious deaths had taken place in January 1921 at the French posts of Dosso and Gaya, close to the frontier. A sanitary barrier was immediately raised between Kirtachi, Dosso, Dogondoutchi and Birmi N'Koni, Maradi and Katsena, but it was not successful in arresting the spread of the disease, which, by the beginning of March, was reported in all parts of the Niamey district.

The severity of the epidemic began to decline in April and it completely disappeared in May. The invasion of the Niamey district by cerebro-spinal meningitis appears to have taken place twice—first of all in January, when the disease was brought by the Dioulas (native traders), and again at the end of February, by infection spread from one person to another. Corresponding to these two methods of infection, the first attack among the native population was more or less mild, the second much more serious.

Between April 2nd and May 15th, the number of deaths was 3,205, or an average of 77 per 1,000 inhabitants in the Miamey district. The proportion of deaths to the number of cases may be estimated at about 85 per cent.

Prophylactic measures. — The heads of the infected subdivisions prohibited all communication between the infected villages and the north of the district. Markets were closed. These measures were difficult to apply because they were opposed to the propensity of the native to move about freely. At Niamey an isolation post was established in an island on the Niger. Every morning the native chiefs were required to submit a statement of the health conditions in their villages. Patients and suspected cases were isolated, and their huts closed or more frequently burnt. All the inmates of infected huts were compelled to report to the dispensary to have their clothes disinfected and their noses and mouths treated every morning with antiseptics.

The military camp was put strictly out of bounds from the beginning of the outbreak ; the mens' noses were smeared twice a day with menthol pomade, and they were made to gargle with a solution of permanganate of potash. Measures were also taken to isolate the district of Niamey from Nigeria. The natives were warned by palavers of the existence of a grave infectious disease among their neighbours, and received orders for the time being to cut off all relations with them.

The campaign against cerebro-spinal meningitis is very difficult in these parts, the population being scattered. The only measures which it is at present possible to take in order to arrest the course of epidemics are the following :

(1) Immobilisation of infected populations, who on account of

their love of travelling and moving about are liable to become very active agents in propagating the disease ; (2) isolation of cases either in their huts or in a group of huts constructed for the purpose, or in some outlying part of the village which has been cleared and converted into a hospital ; (3) naso-pharyngeal disinfection of suspected cases or of persons who have been in contact with cases ; (4) burning of the huts which have sheltered cases. Patients' belongings are exposed to the action of sun and air.

Where these measures can be employed, the results are good. Thus, it was possible to protect the districts of Tillabéry in 1921, and Zinder-Ville in 1922-1923, by barriers which prevented the movement of the population. In the rest of the territory, however, the number of deaths from cerebro-spinal meningitis amounted in 1923 to 1,758. At the same time isolated cases were reported from Upper Volta.

In 1924 the epidemic redoubled in violence ; in the Zinder district the number of deaths was 6,957. Upper Volta reported nine cases and six deaths. In the district of Podor in Senegal, there were 100 cases, of which 56 were fatal.

In Madagascar small epidemic outbreaks of cerebro-spinal meningitis were reported in 1916 and 1917 among the native contingents at Antananarivo, Tamatava and Diego-Suarez.

These men came from districts where cases of cerebro-spinal meningitis were known to have occurred ; they probably included germ carriers.

In order to arrive at the training centres, the recruits had to make long marches or to cross the sea on coasting vessels containing no suitable arrangements for such large numbers of passengers. Finally, on their arrival in the garrisons, these young soldiers had undergone progressive training. Their removal from their homes and families, the fatigues of the journey, transplantation into a new environment, the change of diet, military training, discipline, and also no doubt drinking to excess, constituted a series of factors which tended to weaken the resistance of these natives and to favour the development of cerebro-spinal meningitis. The young recruits were the only victims ; soldiers of some months' standing escaped.

The usual prophylactic measures were taken in the concentration camps. At Antananarivo the best results were obtained by scattering men in little groups among the Malagasy villages around the town, where they were free from the dangers of overcrowding ; by reducing the number of parades, improving the diet, by the isolation and ventilation of huts and daily naso-pharyngeal disinfection by native doctors.

CHAPTER V.

CARE OF CHILDREN AND MOTHERS.

The problems of colonial demography are very largely solved by the desire of the native races to assure for themselves a numerous posterity.

In Africa, the fetishist native believes in the re-incarnation in the child of the spirit of his ancestors, and parents always count upon their assistance after death. A black man will never refuse to support his mother. A daughter is a real family investment. The Moslem is also enjoined by his religion to leave a numerous progeny.

In Indo-China, the whole idea of the family is based upon ancestor worship, and it is a disgrace not to have a male child, who will ensure repose for the souls of his deceased parents. Every family has its household gods and its ancestral tables, before which the natives perform ceremonial rites.

Among the Hindoos, a numerous posterity is regarded as a sign of divine blessing.

In Madagascar, all observers are agreed that the race is exceedingly prolific and that Malthusian practices are unknown. Nevertheless, according to some authorities, there is reason to believe that in a few provinces a change of opinion is taking place on this question.

These ethnographical particulars are confirmed by statistics. Whereas in France the average number of births per 1,000 inhabitants per annum was 18.8 in 1922, the approximate birth-rate for some of the colonies gives 40.2 in West Africa, 44.7 in Equatorial Africa, 23 in Madagascar, 62.5 in the Zinder territory, 55 in the Saigon Valley and 70 in one district of the Congo.

Nevertheless, in spite of religious and social causes which protect the zone against depopulation, the future of the native races is still in great peril.

The main reasons for this are : (1) the slight moral influence exercised by European civilisation ; it must be admitted that certain social diseases like syphilis, tuberculosis and alcoholism, are sometimes found in direct proportion to the spread of European influence. Not only does this influence introduce new elements of infection, but it encourages their diffusion by increasing communication. In the Sudan, the first villages, called " free " villages, were " exile " centres, and were breeding-grounds of alcoholism and venereal diseases. This means that the development of the native should always be undertaken with extreme care, within the framework of his own civilisation and his own social customs. (2) Underfeeding or infectious diseases, which are chiefly responsible for carrying off the infant population, and which are aggravated by the lack of hygiene and by the worst forms of quackery.

We have given the long list of social and endemo-epidemic diseases which ravage the native races, whose powers of resistance are weakened by inadequate clothing and food. Before birth the child is threatened mainly by syphilis ; at the moment of delivery, by umbilical tetanus due to the cutting of the cord by dirty or earth-soiled instruments ; this does much havoc among African, Malagasy and Indo-Chinese infants. In Cochin-China, before aseptic methods were applied, it was responsible for the death of 40 per cent of native children. After birth the commonest complaints are pulmonary and parasitic, since the infant is fed at the breast. Later, during the second period of infancy, diseases of the alimentary canal come first (dysentery, ankylostomiasic diarrhœa, intestinal parasites, etc.), for the native lives in contact with the infested ground. Sometimes he is even geophagous.

It is therefore of the utmost importance to instil gradually throughout the country habits of thorough hygienic and therapeutic prophylaxy.

There are some questions which are for the most part questions of an economic nature, such as under-feeding, unhealthy dwellings, causes of alcoholism, etc., but it is for the Health Service to develop the maternity dispensary which is the foundation of infant care and the kindred organisations relating to fœticulture and puericulture (gynæcological consultations and consultations for pregnant women ; advice regarding infants).

Instruction must be adapted to the special causes of mortality, and care must be taken not to develop too far among the natives methods which, though excellent in Europe, may be dangerous to primitive peoples, as, for example in Africa, the childrens' milk organisations which threaten to substitute artificial feeding for feeding at the breast.

Work in connection with the care of children before and after birth, which has already been started in West Africa, is at present being organised in Indo-China and Madagascar.

At Dakar there is a consulting centre of gynæcology and a maternity home which serves for the training of midwives. It is directed by a doctor with the assistance of two experienced European midwives ; on an average there is one confinement every day. Attached to this maternity home is a consulting centre for pregnant women and a *crèche* for children who have been abandoned. A committee of patrons has organised a workroom which distributes milk to children without a wet-nurse, and in which thousands of babies' clothes are made for distribution to the poor of the town at the beginning of the cold season. Besides that, nurses visit the natives to give advice and to persuade the sick to attend the dispensaries.

In a country as rich as Indo-China, the food question is only of secondary importance, but there is still much to be done to improve the clothing of children and the surroundings in which they live.

In Tongking there are three maternity homes at Hanoi, two at

Haïphong, and maternity annexes to twenty-one hospitals. In ten years the number of confinements at these institutions has risen from 536 to 4,614, not including those of the native maternity home belonging to the Protectorate at Hanoi, the figure for which is 10,948 for the same period.

In Annam a native maternity home is attached to each health institution and is under the charge of a European or native doctor. A *crèche* established at Hué in 1912 turned out so disastrously that it was closed in 1913. The number of confinements in the maternity homes rose from 1,770 in 1916 to 3,622 in 1921.

At Phnom-Penh in Cambodia, the Roume Maternity Home was opened in 1919. It has 60 free beds and 14 rooms for paying patients.

Cochin-China possesses 28 isolated unattached homes, 138 mobile midwife posts and five *crèches*. In 1923 250 midwives completed their course at the Cholon School.

In Annam and Indo-China there is an interesting class intermediate between the midwives of the French schools and the *ba-mu* or native midwives, from whom it is sought to obtain assistance. These are skilled more particularly in the cutting and aseptic bandaging of the umbilical cord.

In Madagascar there are 112 maternity homes, of which 19 are independent institutions, while the others are attached to hospitals or certain medical stations. They have 1,150 beds and the average number of confinements per annum exceeds 20,000.

In order to combat troubles of the respiratory organs due to insufficiency of clothing, the autonomous budget of the relief service provides an appropriation for the purchase of warm clothing, and in several provinces a special branch deals with the supply of warm clothing and enlists the services of native women belonging to the well-to-do classes. Further, a local decree of 1919 compels parents to clothe their children

CHAPTER VI.

NATIVE SCHOOLS OF MEDICINE.

The necessity for making good the numerical shortage of European doctors led the French colonisers to look in the colony itself for native assistants who, by their knowledge of the country, its manners and customs and its language, would also be valuable agents in diffusing European science. From this idea sprang the schools of medicine.

The oldest of these institutions is the native School of Medicine at Pondicherry. Then come in order of time the schools of Antananarivo, Hanoi and Dakar.

1. Pondicherry School of Medicine.

The Pondicherry School of Medicine is more than a hundred years old. Relations between naval surgeons from French squadrons and their native colleagues educated in the missionary colleges and Hindu institutions and possessing enough knowledge to be trained in medicine, were first established in 1823. A kind of unofficial training was given until 1863, when it was established on an official basis by a health ordinance issued by Commissioner-General Bontemps.

The conditions of entrance to the school and the curriculum have been several times revised. A Decree of April 2nd, 1890, which extended the period of study from three to five years, made compulsory an elementary certificate (*brevet de capacité ou de grammaire*) and established a system of day students and boarders. In 1899 obstetrical instruction was organised for the training of midwives.

In 1903, on further reorganisation, students were required to produce a first-class certificate of secondary studies in place of the elementary certificate. In 1914 a competitive entrance examination was established, for which only those candidates were eligible who possessed an elementary certificate or a first-class certificate of secondary education. Candidates who have passed the *baccalauréat* or taken the higher degree are exempted from this examination.

The final organisation of the school dates from May 30th, 1918, and was carried out by an order issued by Governor Martineau on the proposal of Dr. Guerin, of the Colonial Service.

At present the school is attended by :

(1) Students of medicine training for the diploma of native health officer ;

(2) Inoculation students ;

(3) Student midwives.

Since 1863, 110 medical students have passed through the school and 65 health officer diplomas have been granted.

Of the young doctors, some are taken into the service of the Colonial Government ; others set up as private practitioners and generally succeed to the native practice of a relative or connection. The Pondicherry diplomas are recognised by the British authorities as being equivalent to those granted by the Medical Schools of Calcutta, Bombay and Madras.

Recent instructions by the Ministry for the Colonies (November 24th, 1924) contemplate utilising the services of native officers trained at Pondicherry in order to develop social medicine in the French settlements of Oceania. They would be employed, in the same way as students graduating in the Schools of Medicine at Antananarivo, Hanoi and Dakar

are employed in Madagascar, Indo-China and West Africa, in discovering endemo-epidemic diseases (tuberculosis, leprosy, etc.), in diffusing a knowledge of the principles of hygiene and the means of applying them, in inoculation, and in work relating to puericulture and treatment of the sick.

Mobile vaccinators do excellent service in India by penetrating into the most remote villages to inoculate young children. As they all belong to a high caste, they can get into touch with all families and can do much to break down the popular tradition which regards smallpox as the manifestation of a goddess whose anger must not be aroused. At the same time they seek to popularise ideas on health prophylaxy.

The work of the midwives is more difficult, for they encounter the opposition of the local " Dhars ", wives of barbers and laundrymen, who form distinct castes and enjoy the confidence of their clients, and who are the more sought after from the fact that they are sometimes willing to practise abortion. In spite of this competition, however, the maternity homes at Pondicherry and Karikal are every day more and more resorted to.

In short, it is due to the School of Medicine at Pondicherry that measures of public health and medical relief can be applied in India under the most satisfactory conditions.

2. Hanoi School of Medicine.

The School of Medicine at Hanoi was founded on January 8th, 1902 At first a mere native school of medicine, it was converted on May 18th, 1921, into a fully organised institution.

Its first head was Dr. Yersin, of the Colonial Service, the founder of the Pasteur Institute at Nha-Trang, who discovered the plague bacillus.

The staff consists of a medical director with an assistant, three professors and 20 lecturers, of whom four belong to the Pharmaceutical Section and four are responsible for training for certificates in physics, chemistry and natural history.

Students are drawn from all the countries belonging to the Indo-Chinese Union. Classified in the order of their aptitude, the races are as follows : Cochin-China, Tongking, Annam, Cambodia, Laos.

The students, who are few in number, do not wear uniform, but dress like Europeans.

The period of study is four years for medical students and three years for chemists. Chinese students are permitted to attend courses as foreigners.

Since its foundation, this school has granted 179 diplomas for assistant

relief doctors. For the year 1923-1924, the number of students was 120, classified as follows :

Medical Section (degree of doctor)	10
Medical Section (assistant doctor's diploma)	81
Pharmacy Section	10
Midwives	19

In addition, a military section prepares students who desire to become native assistant military doctors for a special leaving diploma.

By agreement between the Department and the naval authorities, a new measure authorises French students at the school who are entering the Colonial Health Service to take, in the colony itself, the entrance examinations of the School at Bordeaux for the Health Service of the Navy and Colonies. This is one of the measures which are being taken to increase the number of doctors in the French overseas possessions. In this way persons living in Indo-China will be able, with the smallest possible outlay, to provide their children with medical training, the cost of which is now very heavy.

The native hospital at Hanoï serves as a training hospital.

Every year the students receive the books which they need for their studies. The school library is granted an annual credit of 2,000 francs for the purchase of French and foreign books and periodicals.

3. Madagascar School of Medicine.

The school was founded by a Decree of December 11th, 1896 ; it is established in new premises in one of the best parts of Antananarivo and has attached to it a native hospital which serves for training.

The School of Medicine is open to natives of Madagascar and its dependencies. The students are mostly Hovas ; some of them belong to the Betsiléo, Sakalava and Betsimisaraka races. Candidates for the entrance examination must be 17 or over and complete two years of preparatory study.

On entering the school, students sign an undertaking to complete their studies there and to hold themselves at the disposal of the administration for ten years after leaving.

During the last ten years, 192 students have been admitted out of 305 applicants. Students rejected as insufficiently qualified may be employed as native hospital attendants, a measure which has been taken in order to avoid creating " déclassés " useless and discontented.

The school is under the charge of a European doctor of medicine appointed by the Governor-General ; the professors are selected, on the proposal of the Director of the School and on the advice of the Director of

the Health Service, from among civilian or army doctors working at Antananarivo.

Scholarships are provided (240 francs) for deserving and necessitous students, and every year books are given as prizes to those who distinguish themselves in the final examinations.

The length of the medical course is four years and students attend the native hospital close to the school, so that they pass without loss of time from the lecture-room to the hospital wards. The school has a library of 2,600 works, and bacteriological, X-ray, electrical and physical laboratories, a dissecting-room and an operating-room.

On leaving, students are appointed assistant doctors in the native relief service. In 1900, four of them successfully took their doctor's examination at Montpellier. In 1903 a doctor was sent to study dentistry in Paris. To-day he is in practice in Antananarivo as a dentist. A few who were assistant doctors during the war are completing their studies in various universities in France.

Since its foundation and up till 1920, the Antananarivo School of Medicine has granted 336 diplomas to native assistant doctors.

There is no school of pharmacy in Madagascar, but there is a school for midwives at Antananarivo and at Fianarantsoa. The former is attached to the School of Medicine and was founded by Dr. Villette in 1900 as a private undertaking, but a few years later he handed it over to the School of Medicine.

The midwifery students are admitted by competitive examination. They sign an undertaking to serve for ten years in the native relief service ; the length of the course is three years. They are then employed either in maternity homes or at the medical stations. Midwives trained at Fianarantsoa are employed among the Betsiléos and in the southern provinces.

An Order of 1921 founded district schools for midwives. Since its foundation and up till 1920, the Antananarivo School has granted 208 diplomas to native midwives.

4. French West African School of Medicine.

This school, which is at Dakar, was founded by a Decree of June 9th, 1918.

The Director is assisted by a Council presided over by the Inspector-General of Public Health and Medical Services, who exercises technical supervision over the teaching of this establishment.

The school is intended for the training of native doctors, chemists, veterinary surgeons and midwives, who are subject to the Statute of April 1st, 1921. This statute offers attractive prospects to candidates : high pay (for doctors 6,000 to 12,000 francs ; for the other classes 4,000 to 9,000 francs) ; the wearing of a uniform, promotion and pensions.

Since 1922 students have been recruited by competitive examination from among the pupils of the Lycée Saint-Louis and persons holding a diploma of higher primary education. Midwifery candidates are admitted after a competitive examination open to all higher schools in West Africa.

The length of the course at the School of Medicine is five years, of which one is devoted to physics, chemistry and natural science (P.C.N.) for doctors and veterinary surgeons. The chemists study P.C.N. for one year and pharmaceutical subjects for three years. Midwives follow a three years' course.

Students who pass the final examination are employed in the Native Relief Service and appointed as far as possible to the colony from which they come.

Up to 1922 the following had attended the school at Dakar since its opening in November 1918 :

Medical, pharmaceutical and veterinary students :

13 from Dahomey,
16 from the Sudan,
22 from Senegal,
10 from Guinea,
12 from the Ivory Coast,
2 from Upper Volta,
1 from Liberia (classed as foreigner).

Student midwives :

16 from Dahomey,
26 from the Sudan,
4 from Guinea,
2 from the Ivory Coast,
1 from Liberia (classed as foreigner).

At present the school is attended by :

19 students of P.C.N.,
40 " " medicine,
6 " " pharmacy,
11 veterinary students,
41 student midwives.

The school has a library of 2,277 volumes. At the time when it was opened, there was only one practical training school, the native hospital at Dakar. In 1918 a free policlinic was added ; in 1919 a native maternity home ; in 1921 a *crèche* with a consulting station for nursing questions. Finally, in 1922, these institutions were supplemented by an anti-tuberculosis dispensary and a dispensary of gynæcology, an anti-venereal dispensary and a dispensary for skin diseases. These various services, grouped under

a joint management and comprising a section of visiting nurses, make up the Institute of Social Health at Dakar.

5. Subsidiary Educational Centres.

Side by side with the Schools of Medicine, there are a few subsidiary education centres.

Guadeloupe has three elementary schools for midwives—Pointe-à-Pitre, Basse-Terre, Camp Jacob.

In Reunion, local chemists are recruited as requirements demand from among students at the lycées who then serve for a time in a local pharmacy.

6. Scheme for a School of Medicine in the Antilles.

The Department has also considered the establishment in Martinique of a preparatory school of medicine to provide young persons with facilities for studying medicine. A large number of young men (51 in 1924) come over to France with scholarships to attend French universities.

CHAPTER VII.

PASTEUR INSTITUTES AND LABORATORIES.

The doctors of the Colonial Health Service were among the first to spread the work of Pasteur in the colonies. Every year a number of them are appointed to complete a course at the Pasteur Institute and every year innumerable research workers find their way from the parent Institute to the scientific establishments in the colonies, there to study in tropical latitudes the diseases peculiar to exotic pathology.

The first laboratory was installed by Dr. Calmette and opened at Saigon. In 1889 he founded a centre for anti-rabies vaccination at Saigon and an institute for the manufacture of animal vaccine for use against smallpox. In 1896 Dr. Marchoux founded a research laboratory at St. Louis in Senegal. In 1899 the Institute of Bacteriology at Antananarivo was set up. Since that time other institutes have sprung up and we will briefly mention them. Some, like those at Saigon, Nha-Trang, Dakar and Brazzaville, are subordinate to the Pasteur Institute at Paris ; others are under the various colonial governments but keep in touch with Paris.

Indo-China.

Pasteur Institute at Saigon. — A huge establishment occupying three hectares of ground and containing :—

(1) A service of human microbiology (anti-rabies and anti-smallpox vaccination ; microbiological analyses ; anti-cholera ; anti-

staphylococcic and anti-typhoid T.A.B. microbe vaccines ; serum deposits from the Pasteur Institute in Paris ; anti-poison serum).

(2) A service of animal microbiology (anthrax vaccination, inspection of slaughter-houses).

(3) Chemical services (biological chemistry, laboratories for the suppression of food adulteration).

In 1923 :—

Number of persons treated for hydrophobia . .	689
" of bacteriological analyses	15,438
" of anti-smallpox vaccine doses supplied	3,059,390
" of bottles of therapeutic sera supplied	50,916

The Laboratory of Social Hygiene has paid more particular attention to the study and prevention of tuberculosis in Cochin-China.

Pasteur Institute at Nha-Trang. — Mainly occupied with animal microbiology and no longer maintaining direct relations with the Medical Relief Service.

Rabies and Bacteriological Institute of Tongking.

In 1923 :—

Number of persons treated for hydrophobia . .	340
" of biological analyses	9,097
" of analyses for suppressing adulteration	227

necessitating 3,339 tests.

Vaccine Institute in Tongking.

Number of anti-smallpox vaccine doses supplied	2,361,280
" of anti-cholera vaccine doses supplied .	13,180

Rabies and Bacteriological Institute of Annam.

Number of persons treated for hydrophobia . .	372
" of bacteriological examination made .	11,829

Institute of Hygiene and Bacteriology in Cambodia.

Number of bacteriological examinations . . .	2,983
" of chemical analyses	145

Institute of Bacteriology and Vaccination of Laos.

Number of bacteriological examinations . . .	2,912
" of anti-smallpox vaccine doses obtained	234,880
" " " " " " supplied	194,300

West Africa.

Institute of Biology at Dakar. — The first laboratory, which was organised at St. Louis by Marchoux in 1897 was removed to Dakar and on August 28th, 1920, became the Institute of Biology for French West Africa. It has relations with the Pasteur Institute in Paris, with French and foreign laboratories, with the Natural History Museum, the International Red Cross League, etc.

It has three sections : human microbiology, veterinary microbiology and biological chemistry. Its present staff consists of two doctors, a bacteriologist and a chemist. Study is made of all questions relating to the biology of rodents and their fleas, vaccination against the pneumococcus, yellow fever, relapsing fever, amœbiasis, malaria, trypanosomiasis, etc.

In 1920 it supplied 285,230 cubic centimetres of anti-plague vaccine.

Laboratory of Bamako. — Founded in 1906 by Dr. Bouffard, Colonial Service, who there discovered in the proboscis of the tsetse fly the evolution of souma trypanosome found in the bovidæ. A serious epidemic of relapsing fever spread by lice has just been studied at this laboratory.

Laboratory of Kindia. — This laboratory was the work of the colonial doctor Le Moal, and followed on his wonderful anti-mosquito campaigns. It was mainly a vaccine-producing centre. At the suggestion of Professor Calmette and by agreement with Governors-General Merlin and Carde, a centre of biological study and monkey-breeding has been organised at Béko, four kilometres from Kindia on a healthy plateau 1,200 metres high. It has been placed in charge of Veterinary-Surgeon Wilbert, who has been instructed to prepare on the spot vaccines and sera against epizootic diseases, which do great harm to the herds and flocks in Guinea (anthrax, peripneumonia, plague).

Monkeys furnish exceedingly rich and adaptable material for experiment, for most microbic diseases attacking the human race can be transmitted to them. It is at Kindia that Dr. Calmette is continuing his experiments in anti-tuberculosis vaccination.

Laboratory of Bassam. — Founded in 1910, it has played an important part in the health of the Basse-Côte, especially in destroying the breeding-places of mosquitos.

French Equatorial Africa.

Brazzaville. — This laboratory was founded in 1906 by the mission undertaken by Martin, Lebœuf and Roubaud to study sleeping-sickness in the Congo. Since January 1st, 1909, it has been administered by the Pasteur Institute in Paris. The colony grants it an annual subsidy of 55,000 francs ; at the present time it is under the management of Dr. Blanchard.

It has always been a centre for the study of trypanosomiasis and its preventive treatment, and it has done important work in connection with the treatment and chemical prophylaxy of sleeping-sickness, the physiology of the tsetse fly, the transmitting agents of the disease, family epidemics, etc. Other interesting research work has been carried out in connection with spirochetæ (tick-fever, jaundice probably transmitted by bugs, a special type of hemoglobinuric gall fever). This Institute also trains the staff of the prophylactic sectors.

Other subsidiary laboratories are at work at Fort-Archambault and Libreville.

Cameroons. — In this colony there is a laboratory at Douala, and a large centre for the prophylactic treatment of sleeping-sickness at Ayos, which has done remarkable work under Dr. Jamot.

Madagascar.

The Pasteur Institute at Antananarivo was founded in 1898.

During the last few years it has been mainly occupied in studying plague, malaria and pneumococcic diseases.

In 1923 :—

Number of cases treated for hydrophobia . . .	93
" " doses of Jenner's vaccine prepared .	786,400
" " examinations of plague specimens .	3,887
" " other examinations of specimens . .	670
Wassermann tests	200

Local strains of plague bacilli and pneumococci were forwarded to the Pasteur Institute in Paris for vaccinal and serotherapeutic investigation.

The expenses of the institution amounted to 50,950 francs.

Side by side with the Pasteur Institute, there is also at Antananarivo an anti-malaria department.

Réunion. — At Saint-Denis there is a laboratory, which was founded twenty years ago.

New Caledonia. — There is a laboratory at Noumea, founded in 1910, and mainly concerned with the study of leprosy.

Antilles. — In these colonies there is a laboratory at Fort-de-France, organised by Noc in 1908 on the occasion of a small epidemic of yellow fever, and another at Pointe-à-Pitre, recently opened.

Guiana. — A laboratory under the convict administration was at first established at Saint-Laurent-du-Maroni. It was later transferred to Cayenne.

Chemical Laboratories of the General Service.

Chemical laboratories have been installed at Dakar, Konakry, Abidjan, Douala, Porto-Novo, Brazzaville, Antananarivo, Diego-Suarez, Noumea, Papeete, Cayenne, Fort-de-France, Hanoi, Saigon, Hué, Pnom-Penh.

In addition to biological and chemical analyses required on behalf of the sick and the hospital services, these laboratories, in the absence of special institutions, carry out other analyses, research work and tests which may be of importance in connection with hygiene, public health, the Customs service, the administration of justice, and the economic development of the colony.

Among the work performed by the chemists of the Colonial Health Service, the importance of which extends beyond the work of the hospitals, must be mentioned : exposition of the part played by vitamines in nutrition, a question which at present governs the problem of feeding ; facts about the manufacture and investigation of imitations of Nuoc Man, the national condiment of Indo-China ; extraction of camphor from the leaves of *camphora officinalum* ; establishing the constants of colonial milk, in order to prevent adulteration ; examination of the thermal springs of Madagascar ; a very complete investigation of Antilles rums ; a study of the vanillas of Tahiti ; and, lastly, a large amount of research work in connection with colonial ores and medicinal and food plants.

PART II.

Medical Monographs on the French Colonies.

INTRODUCTION.

When writing the medical monographs on the various French Colonies, we thought it important to give first of all a short geographical, ethnographical and economic survey. Such indications are essential if we are to form a correct idea of the physical characteristics of each area and the local resistance of all kinds offered to European penetration.

In the course of our journey along the paths of comparative pathology, we notice certain general ideas emerging like peaks above the vast area of the colonial system.

Thus we find that certain diseases, such as amœbic dysentery, tend to become common to all parts as the result of more rapid and more numerous communications, while others, like yellow fever, are disappearing little by little from their former foci. We find that the health of a district improves in direct proportion to its economic resources and the ease with which they can be developed, and that the evolution of the native must take place in strict accordance with his civilisation.

" Laws ", said MONTESQUIEU, " are only the necessary relations resulting from the nature of things ", and care must be taken not to bring ideas from outside into violent conflict with those which have been deeply rooted in the mind of the native as a result of the manners and customs of his ancestors for ages. Conflict not only creates hostility between the colonisers and the colonised, but it is the reason of many mental abnormalities which characterise the natives.

The demographic problem is by no means purely a health question. Medical or hygienic action can only exercise its influence on the unborn child and on its harmonious physical development. It cannot create children by mechanical means. Children are brought into the world by a *moral* agreement between their forbears. There are certain highly developed European populations among whom the birth-rate does not exceed 20 per thousand, whereas among certain peoples who, although primitive, are protected by the spirit of their ancestors, the index figure rises to 70 and 80 per thousand. If success is to be achieved, the European must take account of all these factors.

It was open to us to divide the French colonial empire into two ethnographic groups, the yellow and the black. But as this conception does not yet accord with existing administrative organisations, we have been content with a purely geographical division :

(1) Pacific Group :—

A. Indo-China,
B. French settlements in Oceania,
C. New Hebrides,
D. New Caledonia.

(2) Atlantic Group :—

Antilles :—
    Martinique, Guadeloupe ;
French Guiana ;
French West Africa :—
    Cameroons (Mandated territory) ;
French Equatorial Africa :—
    Togoland (Mandated territory) ;
Islands of St. Pierre and Miquelon.

(3) Indian Ocean Group :—

Madagascar,
Reunion,
Indian settlements,
French Somaliland.

Ayouthia
Mé Nam
BANGKOK
Pétriou
Chantaboum
Cap Liant
GOLFE DE SIAM
M. Krat
Sisophon
Battambang
Angkor
Grand Lac
Petit Lac
Pursat
Kompong Chnang
CAMBODGE
Kompong Thom
Mékong
Kompong Cham
St. Sen
Stung Treng
Khong
Sekhang
Sé San
Sé Bang Khan
Sambor
Kratie
PNOM-PENH
Prey Veng
Takeo
Sre Umbell
Pte Samit
Kampot
Hatien
Phu Quoc
Chau Doc
Rach Gia
Can Tho
Sadec
Vinh Long
Tra Vinh
Soc Trang
Bac Lieu
Ca Mau
Pte Ca Mau
COCHINCHINE
Bouches du Mékang
Poulo Condore
Mytho
Cholon
SAIGON
Thu Dau Mot
Tay Ninh
Loc Ninh
Budop
Bé Cap St Jacques
Be de Ganh Raï
Donnaï
B. Mé Thuot
Kon Toum
Song Ba
Qui Nhon
Phu Yen
Thuy Hoa
Cap Varella
Ninh Hoa
Be de Hone Cohe
Nha Trang
Lang Biang
Dalat
Xomgon
Dran
Be de Cam Ranh
Djiring
Phan Rang
Phan Tiet
Be de Phan Ri
MER DE CHINE
Railways
Roads
Roads under construction


INDO-CHINA
C H I N E
T O N K I N
L A O S
S I A M
A N N A M
C A M B O D G E
C O C H I N C H I N E
Bao Lao
Ha Giang
Cao Bang
Lao Kay
Bac Quang
Nguyen Binh
That Khe
Na Cham
Lang Son
Bac Kan
Lai Chau
Chapa
Tuyen Quan
Thai Nguyen
Moncay
Tien Yen
Sept Pagodes
HANOÏ
Kebao
Haïphong
Doson
Phu Ninh Gian
Iles Norway
GOLFE DU TONKIN
Nam Dinh
Ninh Binh
Than Hoa
Cho Bo
Suyut
Hoa Binh
Dien Bien Pho
M Sing
Tang Ho
M. Saï
M. Sam Neua
Louang Prabang
Mekong
Muong Khang
Muong Sen
Xieng Khouang
Cua Rao
Patang
Vinh
Ha tinh
Tourakom
M. Pak Choum
Nape
Tan Ap
B. So
Kham Keut
VIENTIAN
Nong Khay
Ngansou
Dong Hoï
Thakhek
M. Pou Houa
Dong Ha
Quang Tri
HUÉ
Keng Kébao
Savannaket
M. Tchepon
Bde Tourane
Tourane
Faï Fo
M Saravan
Oubon
Se Moun
Nam Moun
Bassac
Korat
Ayouthia
Khong
Kon Toum
Qui Nhon
Phu Yen
Thuy Hoa
BANGKOK
Pétriou
Sisophon
Stung Treng
Angkor
Grand Lac
Battambang
Sambor
B. Mé Thuot
Ninh Hoa
Nha Trang
Chantaboum
Cap Liant
Pursat
Kompong Thom
Kratie
Kompong Chnang
M. Krat
Kompong Cham
GOLFE DE SIAM
Lang Biang
Dalat
Xomgon
Dran
Phan Rang
Budop
Djiring
PNOM-PENH
Prey Veng
Tay Ninh
Loc Ninh
Thu Dau Mot
Bde Phan Ri
Take
Sre Umbell
Pte Samit
SAIGON
Phan Tiet
Cholon
Kampot
Chau Doc
Mytho
Cap St Jacques
Hatien
Sadec
Bde Ganh Raï
Phu Quoc
Vinh Long
Rach Gia
Can Tho
Tra Vinh
Soc Trang
Bouches du Mekong
Bac Lieu
Ca Mau
Poulo Condore
Pte Ca Mau
HAÏ NA
KOUANG TCHE
Railways
Roads
Roads under construction

CHAPTER I.

PACIFIC GROUP.

A. Indo-China. — B. New Caledonia. — C. New Hebrides. — D. Settlements in Oceania.

A. INDO-CHINA.

(*a*) Geographical Survey.

Indo-China is an enormous peninsula of 330,000 square kilometres, projecting from the Indo-Chinese massif, and running into the China Seas between the Gulf of Siam and the Gulf of Tongking. It is bounded inland by Siam, Burma, Yunnan, Kwang-Si and Kwang-Tung. It consists of four provinces, which lie along the coast ; Cochin-China (59,000 square kilometres), capital Saigon ; Cambodia (100,000 square kilometres), capital Phom-Penh ; Annam (200,000 square kilometres), capital Hué ; Tongking (90,000 square kilometres), capital Hanoi, and a fifth, forming a narrow strip between Annam and Siam, namely, Laos, with capital Vien-Tiane. At the head of each province, which is itself subdivided into a number of districts, is a governor (Saigon) or chief resident. The Governor-General resides at Hanoi, while the Emperor of Annam continues to live in the old imperial city of Hué.

Finally, in order to establish neighbourly relations with contiguous countries, Indo-China has created around itself medical posts which have been set up by the French consulates, in Siam at Bangkok, in China at Mongtzé, Yunnan-Fou, Tchen-Toū, Pakhoi, Canton, and at Hoi-How on the island of Hai-Nan.

Indo-China is well watered by numerous rivers, of which the principal are the following :—

In Cochin-China and Cambodia, the Donnai, which rises in the Mois country and is joined by the Saïgon river, the Vaico and the Mekong. This river descends from the mountains of Thibet, flows through Siam and Pnom-Penh and enters the sea opposite the small island of Pulo Condore. A natural canal discharges the water from the large lake of Tonlé-Sap into this river.

In Laos : the Mekong.

In Annam : the Song-Ma, which flows through the Valley of Than-Hoa, and the Song-Ca, which traverses the Valley of Vinh.

In Tongking : the Song-Koi or Red River, which rises in the

mountains of Yunnan, flows through Hanoi and falls into the Gulf of Tongking. Its principal tributaries are the Black River on the right bank and the Claire River on the left bank. There are also the Thai-Binh, coming from Kwang-Si and known by the name of Song-Chu, and the Loc-Nan. The two are connected by the Bac-Ninh and Song-Giam canals.

These rivers divide into several branches at their mouths, so as to form deltas, the most important being those of Cochin-China and Tongking, with Saïgon and Haiphong as the principal ports.

(*b*) Climate.

The climate of Indo-China has all the characteristics of a tropical climate ; damp and almost constant heat, sudden falls in pressure, intensely luminous atmosphere, etc. Tongking, however, is better favoured. It has a cool season from the end of October till March, during which period the thermometer sometimes falls to 8° [1]. Unfortunately, a fine and continuous rain called the *crachin* sets in towards December. The sky is overcast, and the houses are invaded by a penetrating damp, imparting a musty smell to everything.

(*c*) Economic Survey.

The deltas form rich alluvial plains, protected against floods by dykes. Here vast rice-fields are cultivated and these form one of the principal sources of Indo-China's wealth. Cochin-China alone exports 12 to 14 million quintals of rice per annum.

After rice the principal native products are as follows :—

For textiles : Cotton, most of which is exported to Japan (5,000 tons) ; ramie, used by the Annamites for fishing-nets ; rattans, bamboos, made into paper pulp, and rushes (about 800,000 tons).

Spices and condiments.

Rubber *(hevea brasiliensis)* planted over an area of 15,000 hectares.

Coffee, tobacco, aromatic plants, etc.

The forest wealth is of infinite variety and the subsoil is rich in coal deposits (estimated at 12 million tons) and metals : iron, gold (100 kilos per annum), zinc, tin, graphite, manganese and antimony.

The fishing industry employs a large part of the coast population, since fish, either fresh or salted, forms the staple food of the country. The natives also manufacture oil for lighting (dried coconut), wood inlaid with mother-of-pearl, works of beaten copper, silk embroideries, etc. Surrounded by the markets of Hongkong, Batavia, Bangkok and Singapore, the trade of the colony enjoys a privileged position.

[1] Temperatures are expressed in centigrade.

(*d*) Population.

The population of Indo-China, with the neighbouring territory of Kwang Chow-Wan, leased by China for 99 years on April 10th, 1898, as a result of the German occupation of Kiaochow, is estimated at 19 millions. They are of Mongol race. The inhabitants of the plains, except for the people of Laos (Thais) and the Cambodians (Khmers), are known by the generic name of Annamites, while the mountain folk of the interior, who go by the name of Mois (Thos, Mans, Muongs, etc.) have peculiar characteristics of their own. According to some writers, they represent the native race gradually thrust back by invasion.

In short, Indo-China is a country rich in its soil and subsoil, inhabited by a peaceful and hard-working people with essentially agricultural characteristics, but influenced by the intrigues of a very ancient civilisation of the mandarin stamp ; the family is a powerful institution, which is reinforced by ancestor worship. Their art is complicated, favouring the curved and hollowed line inlaid in precious woods or woven into iridescent silks. Wayward fancies embodied in ideagraphical signs, and sometimes becoming lost in opium dreams, are the form of expression employed by the Annamite race, whose men and women so closely resemble each other in hair, dress and gait that it is difficult for a stranger to the country to distinguish between the sexes.

(*e*) Health Policy.

The health problem was very easy to solve in Indo-China thanks to the economic wealth of the country, the adaptable qualities of its inhabitants and the extent of its roads, railways and waterways. To-day, all the Indo-Chinese provinces are covered with a vast network of health institutions and every year marks a decline in the principal endemic diseases which, like dysentery, used to be so formidable. Malaria still holds out in the remote frontier districts, but the work of sterilising virus centres is being energetically pursued.

Of all the territories in the Union, Laos is the least favoured, by reason of its isolated situation behind the Annamite Chain. Roads, however, have either been built or are in process of construction. It is for Laos, in particular, that Indo-China is considering the use of aircraft for health purposes.

(*f*) General Organisation of the Public Health and Medical Services.

Naval and colonial doctors or medical officers in the colonial forces shared the difficult work of ensuring, often with insufficient means, the working of the health services during the troubled period of conquest, at a time when science did not possess the weapons it now has to fight the climate and endemo-epidemic diseases and, with the assistance of their

civilian colleagues of the Relief Service, to effect the progress that is now being made.

This organisation is to-day laid down in the Decree of June 27th, 1914.

The Public Health and Medical Services of Indo-China include, in addition to the Army Medical Service and the institutions of the General Service :

(1) The Medical Relief Service ;

(2) The Maritime Health Police and protection of Public Health, a Mobile Vaccination Service and the prophylactic treatment of communicable diseases ;

(3) The laboratories ;

(4) Medical training institutions : schools of medicine for natives, midwives and attendants ;

(5) The consular medical posts on the Chinese and Siamese frontier ;

(6) The technical supervision of hospital institutions, homes, dispensaries, leper hospitals, etc., maintained by the general budget, or the local, provincial and municipal budgets ; the inspection of European and Sino-Annamite pharmacies, of schools, prisons, barracks, shipyards and industrial and agricultural concerns.

At the head of the organisation is an inspector-general who at present combines these duties with those of director of the Army Health Service. Further, each country of the Union has a local Director of Health, who in Laos is known as " Head of the Medical Relief Service ".

(*g*) Budgetary Credits (1925).

COLONIES	Local budgets	Share of the Public Health and Medical Services.		
		Personnel	Material	Total
Indo-China :				
(rate of piastre : 10 fr.)				
Governors-General's Department :				
General budget	764,664,900	1,191,800	4,554,100	5,745,900
Share of Far East settlements	3,150,900	874,200	514,800	1,369,000
Tongking	161,390,300	5,632,000	5,379,000	11,011,000
Cochin-China	140,798,500	5,556,320	5,199,310	10,755,630
Cambodia	80,277,180	3,008,980	1,697,530	4,708,510
Annam	83,002,314	4,874,830	4,642,000	9,516,830
Laos	28,985,950	1,757,593	695,000	2,452,593
Kwang Chow-Wan . .	5,400,000	77,000	68,000	145,000
Totals :	1,267,670,044	22,972,723	22,749,740	45,704,463

(h) Health Personnel.

1. *Europeans.*

Civilian doctors :	officials	7
	of the Relief Service	88
	engaged by special contract	8
	private	21
Colonial doctors :	Army	22
	General Service	31
	unattached	27
	expected to arrive from France	9
	Total number of doctors	213
Civilian chemists :	engaged by contract	—
	private	11
Colonial chemists :	General Service	6
	unattached	4
	Total number of chemists	21
Civilian hospital assistants (men)		14
Colonial hospital assistants (men) :	General Service	34
	unattached	—
	Sum total	48
Civilian nurses (women)		53
Colonial nurses (women) :	General Service	21
	unattached	—
	Sum total	74
Civilian midwives		1
Colonial midwives :	General Service	—
	unattached	—
	Total	1

2. *Natives.*

Assistant doctors	185
Assistants chemists	27
Midwives	331
Colonial hospital assistants (men)	238
Civilian hospital assistants (men)	870
Nurses	187
Vaccinators	1

(*i*) Health Institutions.

(On December 31st, 1924.)

Description	Tongking	Annam	Cochin-China	Cambodia	Laos	Kwang Chow-Wan	Totals
Principal or mixed hospitals	1	1	1	1	1	—	5
Secondary hospitals	10	5	22	5	5	—	47
Ambulances or infirmaries	24	11	26	7	4	2	74
Maternity homes	9	11	24	1	—	—	45
Mobile midwifery stations	—	—	127	—	—	—	127
Homes for pensioners and incurables	11	—	—	2	—	—	13
Medical stations, clinics	22	16	21	36	18	—	113
Polyclinics, dispensaries, orphanages	3	—	—	1	—	—	4
Leper hospitals, leper villages	5	1	1	1	2	—	10
Isolation hospitals	1	—	—	—	—	—	1
Land or sea quarantine stations	6	1	1	1	—	—	9
Lunatic asylums	—	—	1	—	—	—	1
Clinical institutes and mobile ophthalmological stations	6	1	1	1	—	—	9
Private Chinese hospital	—	—	—	1	—	—	1
Totals :	98	47	225	57	30	2	459
Number of health institutions on :							
December 31st, 1923	109	51	237	41	25	2	465
December 31st, 1922	96	45	157	42	19	4	363
December 31st, 1921	86	35	153	42	17	3	336

All these institutions are connected with one another by the most diverse means of communication : railways, motor-cars, horse transport, porters, steamboats, canoes, sampans, etc.

The use of aircraft for health purposes is now being studied and surgical aeroplanes have already been tried at Hanoi and Saigon. Aircraft will certainly be used, as has already been done in Syria and Morocco, in

the case of military operations or the urgent evacuation of the sick or seriously wounded, if isolated in a district near to a landing-ground and without normal means of communication.

***

Alongside these relief institutions are the large General Service hospitals : the hospital of Lanessan at Hanoi, the hospitals at Kwang Yen, Haiphong, Saigon, etc., which are open to Europeans, both civilian and military.

Since the war the services attached to the Lanessan hospital have been considerably extended and now include a European maternity home, a special department for disabled soldiers, an artificial limb service and rooms for radiology, ophthalmology and dental surgery. Nevertheless, owing to the rapid growth of the colony, these institutions are likely to prove inadequate and no longer fully meet the requirements of modern hospital science.

(*j*) Scientific Institutions.

Tongking :	A fully organised School of Medicine and Pharmacy	Hanoi.
	An Anti-rabies and Bacteriological Institute	"
	A Vaccine Institute	"
	A laboratory for hygiene and the suppression of adulterated products	"
Annam :	An Institute of Hygiene and Bacteriology . .	Hué.
	A Pasteur Institute	Nha-Trang.
Cochin-China :	A Pasteur Institute	Saigon.
	A School for Midwives	Cholon.
Cambodia :	An Institute of Hygiene and Bacteriology . .	Pnom-Penh.
Laos :	A vaccine farm	

(*k*) Hospital Statistics.

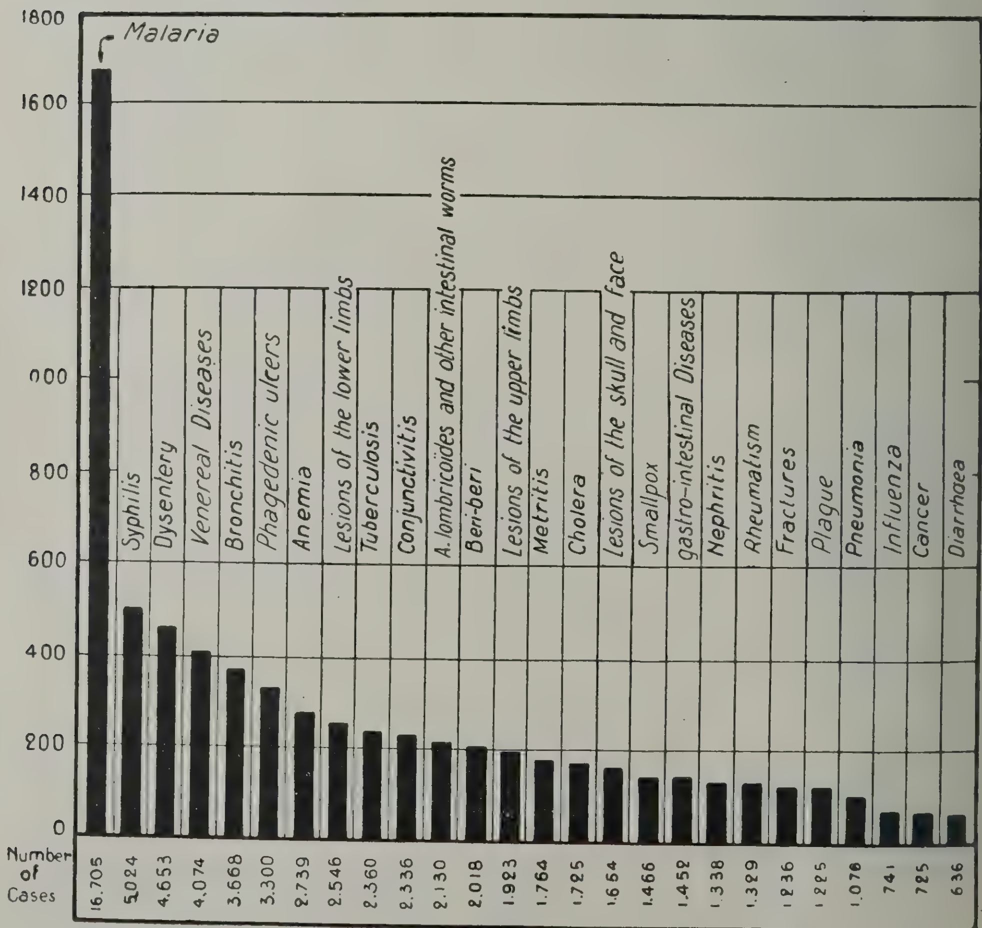
The following table, which shows the number of cases treated in the hospitals of the Native Relief Service, indicates a notable increase for 1923 over former years :

These results are the consequence of the ever-increasing confidence which our methods of treatment inspire in the natives, of the development of our health institutions, and, finally, of the creation within the different provinces of new stations which have enabled the country people to benefit by the work of the Relief Service.

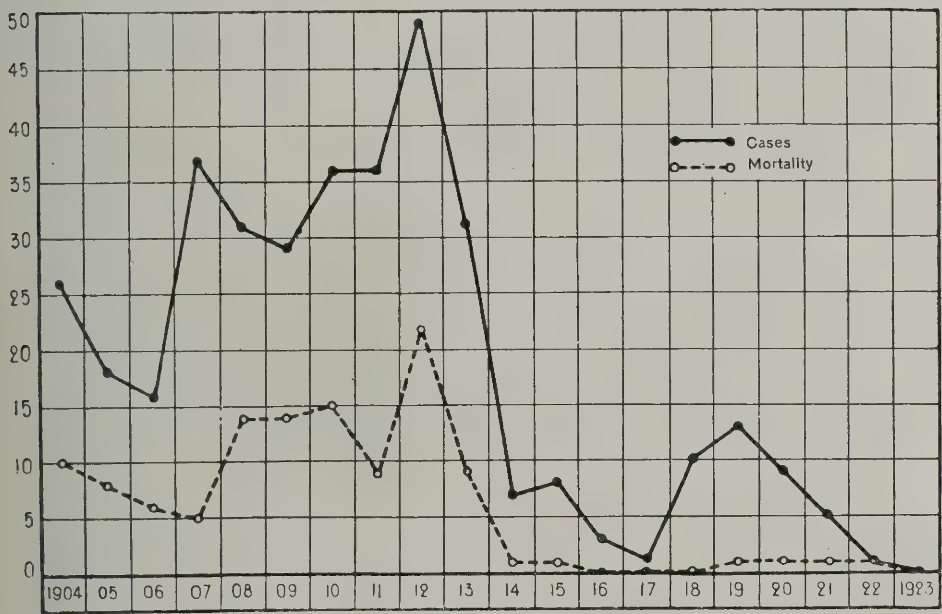
Year	Number of hospital cases	Number of days' treatment.	Number of consultations.
1918	103,495	2,407,739	2,508,696
1919	121,842	2,647,202	2,918,255
1920	129,402	2,740,912	2,963,880
1921	126,458	2,294,447	3,238,587
1922	141,573	2,473,116	3,248,113
1923	160,390	2,668,347	3,682,744

Number of Jenner vaccinations : 3,127,431.

PRINCIPAL DISEASES FOUND AMONG THE NATIVES IN 1922.



Graph showing Hospital Cases and Days of Treatment 1914-1923.



Remarks.

The above table, although it does not fully indicate the pathological condition of the Indo-Chinese population, is nevertheless interesting as showing that, after malaria, the principal diseases are syphilis, dysentery and venereal complaints.

(*l*) Survey of Health Conditions.

The principal endemo-epidemic diseases are : malaria, venereal diseases, leprosy, dysentery, beri-beri, trachoma, smallpox, cholera, plague.

Malaria is by far the most serious disease in Indo-China.

Venereal diseases are very widespread.

There were 5,813 officially ascertained cases of *leprosy* on December 31st, 3,632 of these in Tongking and 1,883 in Cochin-China.

In 1923 the hospitals treated 1,875 cases of *beri-beri* in Cochin-China and 78 in Annam : 260 of these proved fatal.

The commonest forms of *dysentery* in 1923 were amœbic (1,026 cases confirmed by bacteriological tests) and flagellate (868 cases bacteriologically confirmed).

3,476 cases of *smallpox* were recorded in 1923 (643 fatal) ; during the first nine months of 1924, the number of cases was 4,016, including 1,201 deaths.

Cholera, of which the number of cases fell during 1923 (342 cases, 158 deaths), declined still further in 1924 (185 cases, 73 deaths).

Plague, non-existent in Tongking and Laos, showed a decline in 1923 in Tongking, Cochin-China and Cambodia and diminished still further during 1924 in these three colonies. On the other hand, an important focus of the disease appeared in Kwang Chow-Wan.

In 1923 there were 990 cases and 880 deaths.

In 1925 there were 828 cases (511 of them in Kwang Chow-Wan) and 511 deaths.

(*m*) Measures against Leprosy.

The number of lepers in Indo-China during 1923, according to the official returns, was 5,813 ; of these 4,454 were interned in leper hospitals or isolation villages, 283 were under the supervision of the authorities, 956 had escaped and were not yet rounded up, while an order had been issued dealing with 301 others, who had not then been interned.

Therapeutic prophylaxy. — Chaulmoogra ethers are at present used in all the colonies of the Union. They are extracted on the spot in Cochin-China, Cambodia and Annam from the seeds of *Hydnocarpus anthelmintica*, gathered under the direction of the Agricultural Department, because the native oil has been proved superior to preparations made in France. Iodine is no longer added, as this made the intra-muscular injections too painful ; but they remain just as effective. The treatment consists in an injection of 1 cc. the first week, 1.5 cc. the second week, 2 cc. the third week, and so on up to 5 cc. The patient is at the same time given tonic treatment.

The results obtained are so favourable that the leper comes and asks for the injections, whereas he formerly shrank from the other means of treatment. At first there is a very distinct improvement in the general state of health, in the ulcerations, the perforations and in the skin eruptions. Afterwards, the Hansen bacillus seems to resist the treatment and progress is arrested, or at any rate becomes slower. The Hansen lesions sometimes become accentuated during treatment : but this is an incident of short duration, although one calculated to discourage the patient.

Side by side with Chaulmoogra ethers should be mentioned native treatments based on *Hydnocarpus* or *Krabao*, which are also effective. They are habitually used in the form of pills, which contain 23 substances and are popular with the natives in spite of the gastric troubles which they cause.

Administrative prophylaxy. — Are these partial therapeutic successes against a disease supposed to be incurable calculated to modify the old idea of the preventive treatment of leprosy, namely, the *isolation* of the

known leper in his home, if he has independent means, and in a leper hospital in all other cases ?

Private treatment has already been tried and proved a hopeless failure. Scarcely out of the doctor's hands, the patients escape and return no more, in spite of their promises and threats to re-intern them.

Nor does *hospital treatment* appear practicable. In the present state of public opinion, it tends to drive patients suffering from other diseases away from the institution. It is also a great burden on the hospitals owing to the practically indefinite duration of the disease.

It appears from these considerations, which are confirmed by the unanimous opinion of the directors of the Health Service of the Union, that permanent control in a leper hospital still remains necessary. It can, however, be made as little drastic and as humane as possible. It may be on the lines adopted in the light of experience in New Caledonia—the system which is also to be applied in Annam—namely, the isolation village with an infirmary attached for the treatment of patients whose condition may be improved or who may be cured. Arrangements have been made for seven villages in Annam for lepers who cannot be isolated at home. Infectious cases, recalcitrant, disabled and mutilated lepers, and those without means will be interned in these villages. Other cases are *free* and only require to follow the prescribed treatment. The advantages of such an organisation are clear ; normal, social daily life and work, good and abundant food, isolation of infectious cases, opportunities for continuous therapeutic treatment, etc.

The *care of the offspring of leprous parents requires* particular attention owing to the system of free communities in the isolation villages, the result of which will be to bring the sexes together—a thing forbidden in leper hospitals—and increase the birth-rate.

The solution of this problem will be difficult though not from the moral point of view. Indo-Chinese customs allow a family to adopt a child taken from a leprous mother within 48 hours of its birth. But the infant will not be able to be fed at the mother's breast, and artificial feeding is hardly possible except in *crèches* provided with preserved milk and possessing a knowledge of how to use it. It will perhaps be necessary to put babies out to nurse at a monthly payment, as is done by the Public Relief Service in France. Otherwise, the infant will be condemned to almost certain death from gastro-enteritis.

(*n*) Maritime Health Police.

1. *Tongking.*

Headquarters, Hanoi. Head of the Health Service for the colony.
Health district : Haiphong. Medical officer in charge of the hospital.

Principal health official. Quarantine hospital at Haiphong (Ma-Cam) containing two disinfecting chambers, one a Vaillard, the other a Leblanc, and a sulphur room. Mobile material, a Clayton apparatus, Model B, mounted on a barge.

In addition, health stations, provided with everything required for special contingencies, are installed at Binh Vu, Honghai, Port Vallut and Pagoda Point.

Along the land frontiers, travellers are placed under observation in quarantine, whenever it is considered necessary (influenza epidemics, epidemics of diphtheria in China).

Bacteriological examinations are carried out in the bacteriological laboratory at Hanoi.

Tongking has six detachments for health and the prophylactic treatment of trachoma (Thai-Binh, Hadong, Haiduong, Bac-Ninh, Sontay and Nam Dinh). These detachments do excellent inoculation work, but from the sanitary point of view their achievements are less notable.

2. *Annam.*

Headquarters, Hué. Head of the Health Service for the colony.

Health district : Tourane. A quarantine and disinfection hospital ; mobile material ; a Clayton apparatus, large pattern, capable of being mounted on a barge.

There are also medical stations at Quinhon with isolation and disinfection premises, and a small Clayton apparatus, and at Thanh-hoa Nghe-An, Kwang Binh, Thua-Thien, Kwong Nan, Kwang Ngai, Binh Dinh, Phu Yen, Khanhkoa, Phanrang, Binh Thuan.

Sanitary police measures on land are organised in each province by the medical officer in charge of the health institution, who has under him an assistant medical officer and a staff of attendants. During the last ten years, quarantine along the land frontiers has only had to be enforced once, in Southern Annam in 1915, on the occasion of a violent epidemic of plague at Binh Thuan.

In order that the organisation may be thoroughly scientific, the health establishments have a microscope and a specialist hospital assistant who has completed a course at the Hué laboratory.

Each province draws up an annual programme of health and sanitation work to deal with the general causes of unhealthiness and dangerous endemics like malaria, cholera and dysentery.

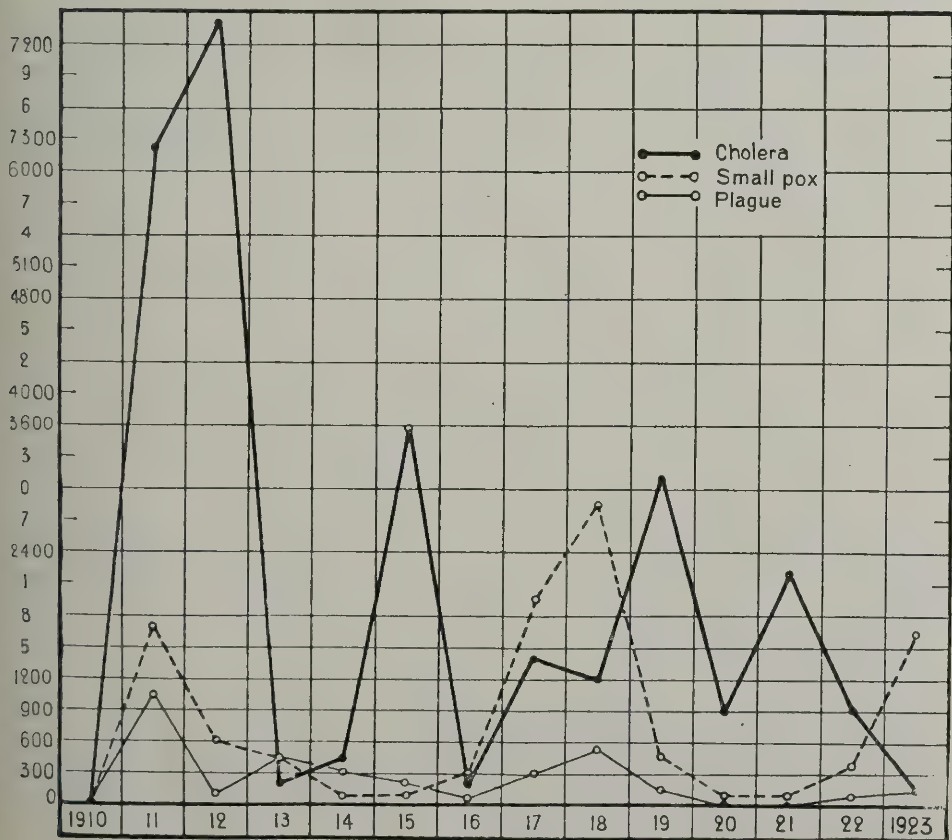
3. *Cochin-China* [1].

By reason of its alluvial and marshy soil, its damp climate, the lack of drinking-water, a population which in some parts is teeming and living in insanitary conditions, its geographical situation, which exposes it on all sides to Far Eastern infectious diseases (British India, the Dutch Indies, Hong-Kong, Siam, Japan, the Philippines), Cochin-China lies open to invasion by infectious and communicable diseases.

Nevertheless, in spite of these unfavourable conditions, the health of Cochin-China is on the whole satisfactory.

General epidemiology. — The following graph furnishes particulars of each of the principal epidemic diseases from which the population specially suffers.

General Epidemiology 1910-1923.



[1] From a report by Dr. Lecomte, Director of the Cochin-China Health Service.

Cholera took the form of violent epidemic outbreaks in 1911, 1912, 1915, 1919 and 1921, the highest point of the graph steadily falling, as may be seen above. This is due to improvement in the general health conditions and to the practice of inoculation against cholera in all centres, such as military camps and shipyards, which are specially liable to attack.

Year	Vaccinations
1919	30,888
1920	34,360
1921	103,635
1922	72,621
1923	19,039

Plague is also declining, thanks to deratting measures, the improvement of the sewage system, and the conversion of native straw huts into brick buildings with cement floors, etc.

Smallpox has made several onslaughts, one in 1918, vaccination not having been regularly performed since the war, and another in 1923 and during the first half of 1924, owing to general epidemic conditions affecting the whole of the Far East. Nevertheless, the Medical Service has done much to combat smallpox by vaccination, as the following figures show :—

Year	Vaccinations
1913	316,424
1914	208,642
1915	277,299
1916	362,321
1917	776,715
1918	1,028,333
1919	774,310
1920	459,154
1921	420,161
1922	444,312
1923	981,328

and, for the first nine months of 1924 : 1,087,889.

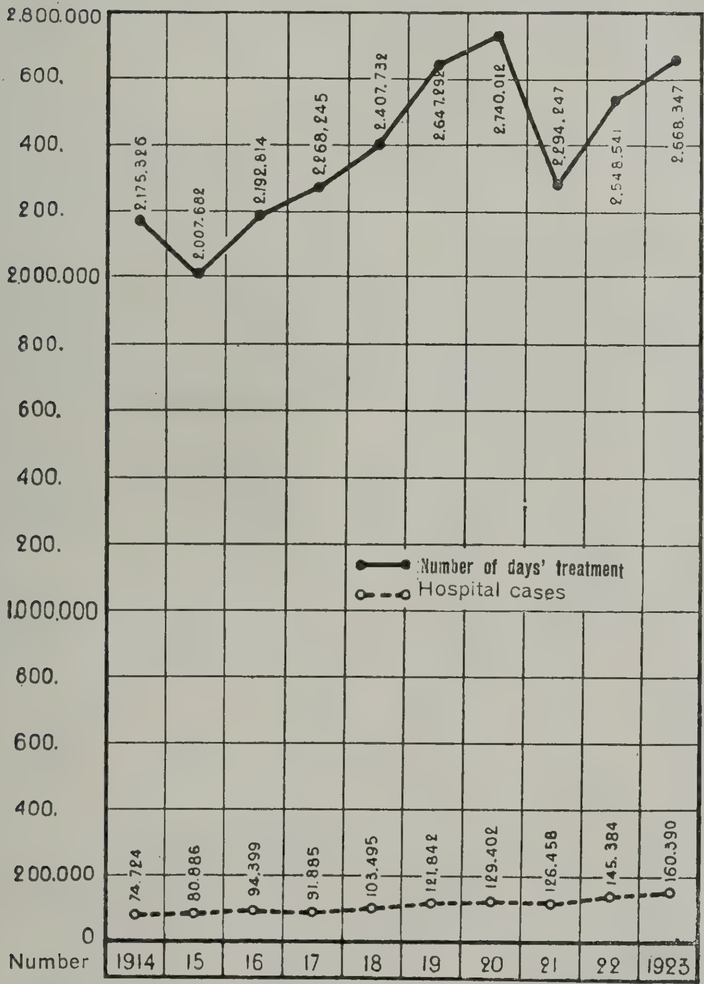
Only 147 cases were recorded in August, September and October, 1924.

There are very few cases of *typhoid fever.*

No case of diphtheria, yellow fever, exanthematic typhus, or relapsing fever has been reported.

Thanks to a new treatment, *amœbic dysentery* and suppurating hepatitis, which it sets up, are declining. The following shows in graph form the figures for the last-named disease :—

AMŒBIC DYSENTERY 1904-1923.



Bacillary dysentery, of which there were 200 cases in 1912, now appears only in the form of a few insignificant outbreaks. It commonly accompanies amœbic dysentery.

There have been a few cases of cerebral meningitis and measles, and three cases of infantile poliomyelitis.

Since the widespread epidemic of 1918-1919, there have only been a few seasonal cases of influenza.

Leprosy is stationary. The number of lepers is estimated at four to five thousand.

From the health point of view, therefore, Cochin-China can stand comparison with its foreign neighbours. The annual report for 1918 of the Health Commission of the British Indian Government gives for that

year alone and for the British provinces only 560,802 deaths from cholera, 276,648 from dysentery and diarrhœa, 93,076 from smallpox, and, for the whole of India, 621,277 deaths from plague. The proportion per thousand inhabitants works out at :—

Country.	Cholera. per mille	Plague. per mille	Smallpox. per mille	Remarks.
British India	2.35	2.60	0.39	Deaths
Cochin-China	0.34	0.13	0,79	Cases reported

It should be noted that, for British India, the percentage only covers deaths, whereas for Cochin-China account is taken of all reported cases.

The Health Police. — Carries out its duties in conformity with the Decree of June 7th, 1922, and places the vessel in one of the following categories : vessel admitted to *free pratique*—placed under *observation*—placed in *quarantine.*

First case : *free pratique.*

Second case : *vessel kept under observation.*

Passengers disembarked :

Treatment: subjected to medical inspection.

Cases : { Choquans (natives)
Principal hospital (European).

Third case : *quarantine.*

Quarantine hospital at Nhabé.

European doctor and native doctor in residence.

Length of quarantine :

Plague : five days from the arrival of the vessel.

Cholera : five days from the arrival of the vessel.

Yellow fever : six days from the arrival of the vessel.

Smallpox : seven days from the arrival of the vessel.

Vessel proceeding upstream to Saigon.

Coming from France : medical inspection of vessel, etc.

From elsewhere : pilot acts as a subsidiary health official. In case of doubt, calls in the medical officer responsible for the medical inspection of vessels.

Sworn personnel :

Director of health.

Principal agent.

Two medical officers for medical inspection.

The medical officer in charge of the Nhabe hospital.

The warder in charge of the Nhabe hospital.

The medical officer at Rach-Gia.

The medical officer at Ha-Tien.

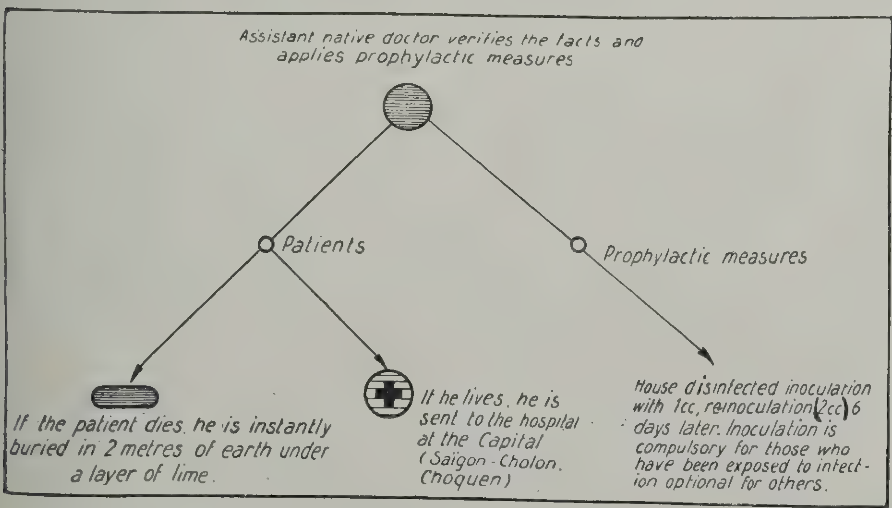
Auxiliary health officials : 15 pilots and 5 Customs officials.

Quarantine hospital at Nhabé 12 kilometres west of Saigon on the west bank of the river. Well equipped. Since 1905 it has received 17,727 persons.

Sanitary material. — For the disinfection and deratting of ships, the Port of Saigon has a Clayton B apparatus mounted on a barge. It is used on an average between 15 and 20 times a year. Health visits were made to 753 steamers and 25 battleships during 1923.

Land frontiers. — There is no great fear of pestilential diseases invading the country by land, as Cochin-China is surrounded by thinly-peopled marshy country and tropical forests. Nevertheless, the Cambodian frontier has to be watched for fear of plague, as well as the great Mekong river, which runs almost at right angles to the frontier.

Internal sanitary protection. — The provincial administration is notified of all cases of infectious disease by representatives of the Council of Notables or by the medical officer of the secondary medical stations. The following sketch shows the defensive measures which are immediately taken :—



Cholera. — Anti-cholera vaccine is supplied fresh by the Pasteur Institute at Saigon on request.

A case is reported by some responsible person to the head of the province, who informs the medical officer.

Inoculation each year is compulsory for soldiers, militia-men, prisoners and shipyard workers.

Sanitary Protection of Saigon-Cholon. — Saigon-Cholon has been studied with a view to making it an urban centre containing a million

inhabitants. The estimates for the sanitary improvement alone amounted to 200 millions : drawing-off of drinking-water from the Donnai and the Song-Bé, collected 30 kilometres away and purified ; completion of the sewage system ; construction of a factory for converting and burning refuse, etc.

Health and sanitation in the Provinces. — Schemes are drawn up by Health Commissions, presided over by the administrator of the province. On these Commissions a European doctor and a public works superintendent are represented *ex officio*. As regards building, the grants made to the communes divide the centres into three areas, the first in which all buildings must be constructed of brick and covered with tiles, the second, which permits wooden buildings covered with tiles, and the third, where the owners are free to build as they think fit.

Mobile health detachments. — Two detachments have been formed dependent on the native hospital at Cholon. Each has an assistant medical officer and a medical attendant with a small bacteriological outfit. The duty of these detachments is to replace the ordinary health staff in the provinces. The Pasteur Institute, with the aid of an entomologist, is responsible for organising campaigns against mosquitos.

Liaison with neigbouring countries. — Weekly returns giving all reported cases of communicable diseases are regularly sent to the British, American, Dutch, Italian and Japanese Consuls at Saigon, and to the Director of the Health Service at Bangkok. Similar returns are forwarded by the French Chargé d'Affaires to Siam and to the Health Department of the Dutch Indies. The French Consul at Hong-Kong telegraphs every week the number of cases of pestilential diseases during the course of an epidemic. There is also constant communication with Calcutta and Australia, and every effort is being made to establish still closer contact with the medical authorities in foreign countries.

4. *Cambodia.*

Headquarters : Pnom-Penh. Head of the Health Service for the colony.

Health district : Pnom-Penh. Chief medical officer, chief health officer. No quarantine hospital, but the port has arrangements for the isolation of Europeans and natives at the mixed hospital. Mobile material. A Clayton apparatus mounted on a junk.

There are, in addition, medical stations at Kampot, Kep, Srécham, Sré-Umbél or Bac-Ken, on the little island of Khone and at Snam-Craben.

The necessary bacteriological examinations are made by the bacteriological laboratory at Pnom-Penh, which has a supply of sera and vaccines to meet any emergency.

The land frontiers of Cambodia are also controlled and measures taken to ensure the health of the country.

5. *Laos.*

Headquarters : Vien-Tiane. Head of the Health Service for the colony.

Laos has no maritime frontier and is protected by the Annamite Chain against epidemics coming from Annam. It is traversed from north to south by a large river, the Mekong, 1,000 kilometres long, which has to be watched more particularly from Vien-Tiane to Pak-Moun at points where the river serves as the common frontier between Siam and Laos. Epidemics of cholera originating in Siam or Cambodia have been reported at Vien-Tiane, Cammon, Savannaket and Pak-Sé.

Laos has a Clayton apparatus. The question of organising health control posts on the Mekong is at present under consideration.

Annex.

The Province of Laos : its Opening-up and Health Organisation.

General Survey. — Laos is a long strip of country following the course of the Mekong from Yunnan to Cambodia, enclosed between Tongking and the Annamite Chain on the east and between China, Burma, and Siamese Laos on the west. " It is a country enclosed among mountains " (Jean Brunhes) inhabited by Thai (the Laao from whom is derived the name Laos), living mostly in the valleys, by tribes of Chinese origin scattered over the mountains of the north and by semi-savage peoples of Malay origin inhabiting the high plateaux.

The capital, Vien-Tiane, was destroyed by the Siamese in 1827. Of the ancient organisations, there still remains the territory of Lwang-Prabang, which is governed by a local monarch under French protection.

The people of Laos are supposed to be gentle and indolent. Nevertheless, where they have been employed, and due account has been taken of their ethnical characteristics, they have given satisfaction. The road from Napé to Thakek is entireley the work of Laotians.

Its economic resources are considerable.

The *fauna* includes the elephant, the horse, the buffalo, the dog, the pig, the rhinoceros, the bison, the ox, the stag, the antelope, the boar, the bear, the duck, etc.

The *flora* is rich and variegated and, according to one writer, " Laos was the paradise of naturalists ". The forests contain teak, pseudo-mahogany, pseudo-rosewood, pseudo-walnut, and ebony trees, yielding benzoin, cardamom, indigo, gambier, cloves, curcuma, ginger, yam, taro, dwarf palms, black-lac, various resins, etc. Crops include rice, maize, tobacco, cotton, sugar cane, indigo, hemp, ramie, sweet potato, ground nuts, areca, betel, mulberries, opium poppies, the paper tree, tea, etc.

Gold, tin, copper, lead, iron, coal, antimony, etc., have all been found. Tin is already worked in the province of Cammon in the Nam Patène mines. The natives also work iron ores, but on a small scale only.

Separated from the outside world by the Annamite cordillera on the east and by the rapids of Mekong on the south, Laos was geographically cut off from communication with the other Indo-Chinese provinces. Thus, " all her resources have hitherto been directed towards Siam, her neighbour and ethnical parent, whose pronounced economic development has appeared in the construction of railways and roads " (J. Brunhes) [1]. A glance at the map will show that Bangkok, the capital of Siam, has become the centre from which radiate railways and roads carrying into Siam all the wealth from the valley of the Mekong : there is the line from Bangkok to Krabin, which is to be extended as far as Pnom-Penh, the line from Bangkok to Korat, which will branch fan-wise to serve Ubun and Kon-Kaen, and the line from Bangkok to Chieng-Mai, already open.

French Indo-China cannot but be concerned at this anomalous state of affairs and seek to turn the opening-up of Laos to her own advantage, first by establishing communication with Laos by the natural means of the Mekong, and then by building roads and railways.

The first attempt to open up communications by the great river artery dates back to 1835. In that year a torpedo boat commanded by Captain Reveillère succeeded in navigating the river as far as the rapid of Preapatang. In 1889 Captain Heurtel took the *Cantonnais*, a steamer 40 metres long and of 1.90 metres draught belonging to the Messageries Fluviales, as far as the foot of the Khone falls. As the barrier of rocks was impassable, a railway was constructed for the transhipment of light boats on the Island of Khone, and in 1894 the *Massic*, a gun-boat, cleared the Kemmarah Rapids at flood-tide and moored alongside Vien-Tiane. Then, in the following year, Lieutenant Simon, on the *Lagrandière*, proceeded up the Mekong as far as Lwang Prabang and Tangho, 2,450 kilometres from the sea and 470 metres above sea-level.

As a result of work undertaken to improve the navigation of the river, the province of Bassac with its important rice-fields was completely opened up, but it was found that beyond the Kemmarah Rapids all hope of navigation yielding a commercial return must be abandoned.

A beginning was made with the construction of roads a long while ago, but it is only during the last few years that any results have been obtained.

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[1] Works consulted : "*Le Laos débloqué*" by Professor Jean Brunhes : "*Le chemin de fer de Tan-Ap à Thakek*" by Henri Cucherousset, Director of the *Eveil économique de l'Indochine*, and a Report by Dr. Guillemet, Head of the Health Service of Laos.

The road from Dong Hoi to Savannakhet, which was begun in 1893, will be nearly completed by the end of 1925. Another road from Vinh-Nape to Thakek, which has been under construction since 1913, is also near completion. Another, which is intended to gain the plateau of Tranninh and the Kingdom of Luang-Prabang, has been built from Vinh as far as 40 kilometres beyond Chieng Khuang. We should also mention a road of 90 kilometres running parallel to the Mekong from the Nam Patene Mines to the river.

Finally, plans are now being considered for the construction of a railway starting from Tou-Ap on the Grand Côtier and extending to Thakek. In view of the obstacle formed by the Annamite Chain, this course appears the easiest to follow and Thakek, which lies lower down the river than seven of the eleven provinces which make up Laos, is very well placed to receive traffic from the upper and middle parts of the country and even from Eastern Siam. Although it is impossible at the present time to establish the figures for the imports and exports of Laos, 500,000 square kilometres may be reckoned as the area of the French and Siamese districts which will feed the railway. Inhabited by a million and a half natives, these rich territories will be given an economic impetus, thanks to new methods of utilising the local resources.

Health Organisation. — The health institutions of Laos are still very imperfectly developed and it is for this province that the use of aircraft for health purposes has been particularly considered. The following is a summary of the organisations as they now exist.

Medical relief is furnished by :

Five hospitals established in the chief towns of the province : Luang-Prabang, Savannakhet, Chieng-Khuang, Paksé. (These institutions mostly contain a ward for Europeans, a native ward, a ward for infectious cases, one for convicts and prostitutes, a dispensary and a maternity ward. A hospital is to be established at Thakek and there is a vaccine-producing institute at Vien-Tiane) ;

Four temporary infirmaries for the Upper Mekong (Sam Mena and the fifth military zone) ;

Four first-aid posts for road workers ;

Two leper hospitals.

The following statistics give the number of cases treated between 1904 and 1924 :—

Year	Hospital cases Europeans	Hospital cases Natives	Days of treatment Europeans	Days of treatment Natives
1904	23	186	311	2,354
1905	23	215	298	3,000
1906	72	546	1,084	9,409
1907	60	608	1,054	12,354
1908	44	785	664	14,929
1909	56	1,054	950	18,011
1910	55	1,177	929	20,696
1911	52	1,206	786	25,417
1912	55	1,590	919	29,417
1913	48	1,337	1,000	31,391
1914	45	1,145	992	36,978
1915	78	1,769	1,886	45,103
1916	75	2,119	1,786	52,916
1917	60	1,882	1,462	48,959
1918	53	2,703	854	58,799
1919	84	3,454	1,771	67,173
1920	119	3,340	3,271	69,913
1921	67	3,006	1,229	63,067
1922	62	3,591	1,058	61,421
1923	38	4,685	571	76,089

Thus, 1923 recorded 25 times more hospital cases and 31 times more days of treatment in the case of natives than 1924. The number of convalescents, which was 1,105 in 1904, had risen by 1923 to 92,841.

The commonest diseases are :—

	Malaria	Dysentery	Tuberculosis	Syphilis
1919	1,134	141	44	67
1920	1,029	285	38	91
1921	858	185	28	126
1922	1,033	227	40	126
1923	1,282	203	82	29
1924	2,031	351	57	115

Trachoma is also fairly prevalent and it is intended to establish an Ophthalmic Institute by 1929.

Active measures are being taken against *malaria*. Ninety government quinine stores have been organised where quinine is sold in tubes of 10 tablets of 0.15 centigrammes at 10 centimes each.

57 kilos of quinine were distributed in 1921,
92 " " " in 1922,
65 " " " in 1923.

Smallpox. — Since 1914 statistics show 4,194 cases of smallpox, including 1,132 deaths. The number of vaccinations was 59,031 in 1921, 46,267 in 1922, and 77,661 in 1923. The vaccine is supplied by the Vaccine Institute at Vien-Tiane.

Cholera. — Cholera of which 11,300 cases (2,389 deaths) have been recorded since 1924, invades the country mainly from Siam and Upper Cambodia. In 1919 Laotian cattle-dealers returning from Upper Cambodia brought cholera into Paksé. Thence it spread into the districts of Saravan and Attopeu. In 1922 infection was brought by coolies coming down during the dry season to work in Upper Cambodia, who disseminated the disease in the villages.

During the last few years there has been considerable migration into Laos by Annamites, who provide labour for the building of roads. These groups, consisting of weary and underfed men, require careful sanitary supervision. This is difficult to effect owing to the huge length of the land and river frontiers, which extend for more than 1,000 kilometres. The main observation posts are to be established at Khone, through which travellers must pass when coming from Cambodia, and at Thakek, the terminus of the railway from Vinh. There will be auxiliary stations at Paksé to control entry from Siam via Ubun ; at Chepon, which commands the road from Dong-Hoi to Savannakhet ; at Vien Tiane and Pak Lay, near the railway from Bangkok to Utaradit ; at Huei-Sai and Muong-Sing on the confines of Siam, Burma and Yunnan ; and at Nong-Het, the gate of the Tranninh plateau on the road from Vinh to Chieng-Kuang.

To be effective, however, these measures would have to be embodied in permanent sanitary agreements between Laos and her immediate neighbours, China, Burma and Siam.

B. NEW CALEDONIA.

(*a*) Geographical Survey.

New Caledonia lies between 161° and 165° of east longitude and 20° and 25° of south latitude. It is about 400 kilometres in length, 50 kilometres broad, and a chain of mountains varying from 800 to 1,000 metres high crosses it at its widest point. The country is well watered and fertile ; the interior is wooded.

Coral reefs form a belt round the island, leaving between the reefs and the coast, particularly on the western side, what actually amounts to a canal suitable for the coasting trade.

The nearest continent is Australia, from which New Caledonia is separated by about 1,300 kilometres. Its geographical situation has made it of great importance since the opening of the Panama Canal, for it lies not only on the route from San Francisco via Panama to Sydney but on the

route New Zealand — Indo-China via the Solomon Islands, New Guinea, Java and Sumatra.

(*b*) Population.

The area of New Caledonia is 20,000 square kilometres ; it has 46,950 inhabitants, of whom 26,857 are New Caledonians or Kanakas, belonging to two different races, the Melanesians and the Polynesians, who have largely intermingled. The remainder of the population consists of 16,482 whites and about 4,000 Asiatic or New Hebridian workers. Convicts are now only an insignificant element (2,200).

(*c*) Climate.

The colony is healthy, and its climate is similar to that of temperate countries. It is one of the few settlement colonies suited for colonisation by families. Maximum temperature 36°, minimum 13°.

(*d*) Economic Survey.

Products of the Soil.

The climate of New Caledonia is suitable for the cultivation of both tropical and temperate products. All vegetables do well.

The main agricultural products are the following :—

Coffee. — This plant thrives best in sheltered land with a good depth of soil ; it can be planted to the extent of 1,600 trees per hectare ; the crop, which begins in the third year, is plentiful by the fifth.

Maize. — Two crops a year giving an excellent yield particularly during the first years.

Rice. — A very profitable crop on moist soil. Yields two to three tons per hectare.

Manioc. — Does very well on all kinds of soil if not too moist. A very paying crop giving a large yield. Cooked in water it can if necessary take the place of bread ; used in making tapioca. Poultry and cattle can be fed on it cooked or raw.

Coconut. — Yields its fruit after ten or twelve years and bears from 50 to 80 nuts. It yields about two tons of copra per hectare.

Cotton. — The species cultivated are of the hardy variety ; the first crop is ready after nine or ten months and yields about one ton of seed cotton per hectare. This crop will greatly help the newly arrived colonist.

Vanilla. — Should be grown at the foot of the protecting trees in the coffee plantations ; its cultivation, gathering and preparation require careful attention, but the work is light and suitable for women.

Forests. — The island contains 200,000 hectares of wooded land, 100,000 of which is real forest.

The timber includes rosewood, sandalwood, light and supple kaori, column pine, ironwood, grey beech, black beech, azu, red oak, Montrouzier " hup ", river tamanu, mountain tamanu, gum oak, acacia, etc. Finally, the niauli (*Melaleuca viridiflora*), which covers a vast extent of ground and seems to make the colony healthy ; its leaves are used to distil niauli essence, known in pharmacy as " gomanol ". Its bark serves for the roofing of sheds and furnishes good protection from the heat.

Raising of Stock.

New Caledonia has 800,000 hectares of natural pasture land ; about three hectares are required to feed one head of cattle.

Horned cattle. — These number about 100,000. An ox of four to five years old gives 300 kilos of meat.

Horses. — The climate and pasturage are perfectly suited for horses.

Sheep. — A grass known as spear grass, very common on the west coast, has seeds with hard bristles which penetrate the flesh of sheep and give rise to serious diseases which inflict heavy losses on sheep-farmers.

Goats. — These are very prolific and thrive in all parts.

Pigs. — Very common and an important article of trade.

Poultry. — Chickens, ducks, turkeys, guinea-fowl, peacocks and geese are very successful.

Fish. — Fish is abundant but there is little fishing.

Wild animals. — There are no dangerous animals and only a few

snakes, all harmless. Deer are found in large numbers in spite of their being hunted ; there are also turtle-doves and sea-game.

Industry.

Three preserved-meat factories, a foundry, cotton ginning works, a seed-drying mill, an oil-works, salt works, a rum distillery, a rice mill, a tannery, a button factory, confectionery and jam-making, perfumery, etc. ; butter and cheese would also find markets in New Caledonia.

There are well-equipped workshops in which the necessary repairs for the Caledonian merchant fleet can be carried out.

Mines.

The exploitation of the mines is regulated by a Decree dated January 28th, 1913, and by local orders.

New Caledonia contains nickel, cobalt, chrome-iron, copper, gold, manganese, antimony, argentiferous lead, mercury, and various other metals.

Gypsum, phosphates and coal are also worked. Boring has revealed the presence of oil.

Trade.

In 1922 the total exports of the island amounted to 31,234,358 francs and imports to 43,432,776 francs.

(*e*) Administrative Organisation.

New Caledonia is administered by a Governor, who is assisted by a Privy Council and is under the authority of a General Council. It appoints a delegate to the Supreme Council for the Colonies.

(*f*) Organisation of the Public Health and Medical Services.

New Caledonia, *a colony for settlement*, has long ago had to take the necessary steps to ensure medical attention for the white colonies scattered over its territory. Moreover, the existence of a native population, valuable as labour but rapidly diminishing in numbers, has imposed as a primary duty on the Administration the creation and organisation of medical relief work for the tribes and the adoption of preventive measures against the endemic diseases which are decimating them.

These social characteristics of the Colony are reflected in the organisation of its Public Health and Medical Services. A Director of the Health Services ensures unity of administration. In that capacity, he directs all medico-military work (general services and troops). As Director of Health, he ensures the protection of public health (Maritime Health Police, general

hygiene and prophylaxy). Finally, as inspector of native relief services, he co-ordinates and encourages the efforts of medical officers for the colonies and native relief. This service has been working for a long time now, but it was reorganised by a Decree of the Governor dated March 31st, 1919, modified by a Decree of September 5th, 1921. Ten posts for colonial doctors were created, nine of them for New Caledonia properly so called and one for the Loyalty Islands. These doctors are required to attend : (1) Officers, officials and agents of the local or municipal colonial services, and their families, (2) natives of whatever origin, (3) natives living in tribes or enrolled men. They are responsible for supervising the tribes within their district from the point of view of health and treatment. They must visit the different communes in their district at least once a month, carry out inoculations, inspect schools, etc.

(*g*) Health Institutions.

The Health Institutions in the Colony include :—

1. A general service establishment : the colonial hospital at Noumea, which is managed by the Director of the Health Service and a resident medical officer. This hospital, which is very well situated and adequately equipped, suffices to meet all present requirements.

2. Local service establishments : the Orphanage Infirmary at Noumea, which treats natives and Oceanic or Asiatic indented labourers, with accommodation for lunatics and wards for the poor and aged. A civilian doctor is responsible for the medical work of this establishment. He is assisted by a European nurse and native attendants. An infirmary has been established at Bourail and another at Lifou. It is intended to create other institutions of this kind so that all the colonial medical posts may be suitably provided.

(*h*) Health Personnel.

Civilian doctors :	of the Medical Relief Service	—
	engaged by contract	10
	private	2
Colonial doctors :	of the Colonial Army	—
	unattached	4
	General Service	2
		18

Independent civilian chemists		3
Chemists of the Colonial Army :	General Service	1
	unattached	—
	Total :	4

Civilian hospital assistants		3
Colonial " "	: General Service	13
	unattached	—
	Total :	16

Civilian nurses		2
Colonial "	: General Service	1
	unattached	—
	Total :	3

Natives :	laboratory assistants	1
	hospital assistants	2
	Sanitary Police	13
	Total :	16

(i) Scientific Institutions.

Since 1913, New Caledonia has had a Microbiological Institute under an unattached Colonial Army medical officer. He is responsible for analyses, the preparation of smallpox and plague vaccines and plague serum, and for etiological and therapeutical research work on leprosy. The Director is also charged with the medical supervision of leper hospitals.

(j) Leprosy [1].

1. *Present Situation.*

The last official census figures (July 1st, 1921) gave the population of New Caledonia as 46,950, of whom 26,857 were natives divided into three groups : New Caledonia proper and the neighbouring islands, the Isle of Pines and the Loyalty Islands (Maré, Lifou, Ouvéa) and 16,482 Europeans (14,172 free and 2,310 convicts).

On May 1st, 1924, statistics gave the following results :—

Natives : 578 officially certified lepers,
300-350 suspected cases.
By adding 10 per cent for concealed lepers, the total in round figures works out at 1,000 lepers, or 3.72 per cent of the population.

[1] From a work by Dr. Genevray, " La lèpre en Nouvelle-Calédonie ", *Bulletin de la Société de Pathologie exotique,* January 14th and February 11th, 1925.

Europeans : 158 officially certified lepers,
8 suspected cases.
which makes a total of 166 lepers or 1 per cent of the population.

Immigrants : 2 lepers (one Javanese and one Arab).

Total : 1,168 lepers, making a total percentage of 2.48 of the population.

Women are, for the most part, less susceptible than men, and the nervous form of the disease is distinctly commoner than the other forms, except among Europeans and the natives of the Loyalty Islands (particularly Ouvéa), who, when they do contract the disease, suffer mainly from the cutaneous, maculate and tubercular forms.

2. *Dissemination of the Disease in the Islands.*

Natives. — On the main island, leprosy made its appearance in 1866. It spread over the whole island in consequence of the insurrection in 1878 of the Kanaka tribes on the east coast, who marched against the rebel tribes of the west coast and seized their wives and children as booty.

Leprosy was introduced into the Isle of Pines by natives from the main island, exiled after the rebellion of 1878 ; into the Loyalty Islands on Maré in 1880 by a Protestant missionary teacher who came from Guinea with leprosy ; and into Ouvéa by a native from Puebo (Main Island 1894).

After making its appearance in the Caledonian Archipelago, leprosy increased and reached its height in 1899 and 1900. It then began to decline, although 25 or 30 years ago many doctors were prophesying the infection of the whole population within some twenty years.

This decline is due to (1) the isolation of cases, (2) a change in the form of the disease. The tubercular form, which was formerly the only one, is now much less frequent than the nervous form. In the course of thirty years, the Hansen bacillus has tended to attack the nerves rather than the skin, and consequently has less power to disseminate the disease than open tubercular lesions swarming with infectious bacilli.

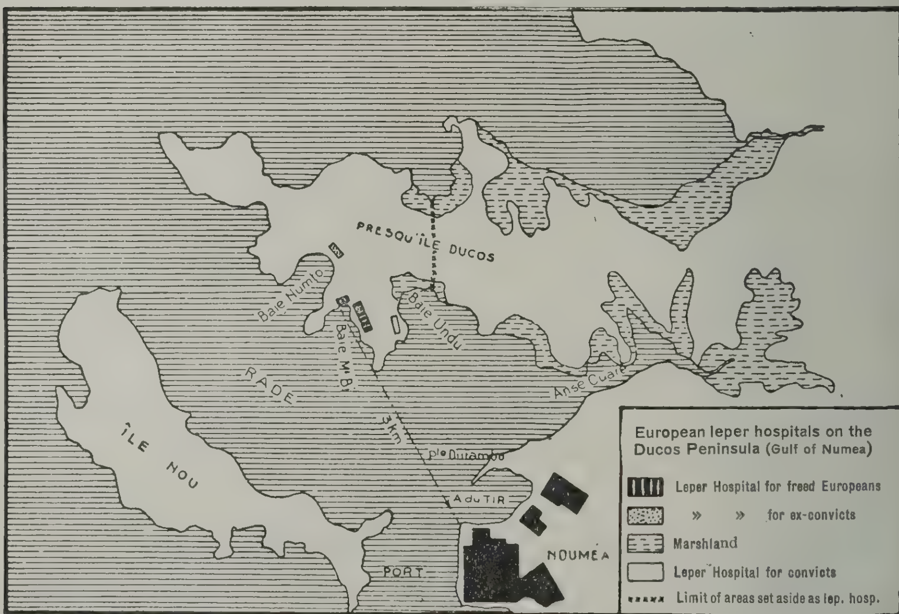
Europeans. — First case recorded in 1888 ; in 1894, 45 cases ; in 1898, 132 ; in 1913, 211 and in 1924, 158. These figures show a gradual decline, which should become still more marked with the disappearance of European leper convicts. On the other hand, the free element in the population is now seriously infected, and the convict element has created foci which serve to disseminate the disease.

3. *Leprosy Prophylaxy.*

(1) *Rounding-up of lepers.* — Half-yearly inspection of the tribes of each district by the Colonial Medical Officer ; a commission of experts consisting of the Director of the Health Service and of the Pasteur Institute, which examines suspected persons reported by the police ; inspects indented labourers and natives travelling from one part to another ; controls natives allowed to accept employment as domestic servants ; examines recruits and pupils at schools ; inspects the convict element.

2. *Isolation of lepers.* — This was made compulsory by a Decree of September 22nd, 1893, confirmed by a Decree of September 20th, 1911.

New Caledonia.



(a) *Europeans.* — Assembled since 1918 on the peninsula of Ducos (Gulf of Noumea), and distributed among three leper hospitals according to their social standing ;

Condemned criminals, colonial deportees in groups and singly, freedmen of the first category, isolated at the leper hospital in the Bay of Undu, which will disappear when the convict prison closes down. There are only fifteen cases in the hospital at the present time.

Freedmen of the second category and deportees whose sentence of deportation has been remitted are chargeable to the local budget and isolated in the Bay of Numbo.

Free Europeans are interned in the Bay of M'bi. The leper-hospital constitutes a village of about thirty houses, with an infirmary, a school,

a chapel, a wash-house, shower baths, and grounds where the patients rear poultry. Lepers are permitted to marry, and the children of these unions are removed the day after birth, to be kept under observation in the patients' families.

The Director of the Institute of Bacteriology arranges for medical visits to the three leper hospitals three times a week.

(b) *Natives.* — Since the closing of the leper-hospital on the Island of Art, a return has been made to the system of partial leper-hospitals, 55 on the main island, 1 on the Isle of Pines, 8 for the Loyalty Islands (2 at Mare, 3 at Lifou, 3 at Ouvea).

These isolation villages are administered in accordance with a Decree of July 12th, 1921. In most of these leper-hospitals, however, the isolation is a fiction.

That being so, should a return be made to the central leper-hospital ? America's experience on the Hawaiian Islands is not encouraging. In spite of powerful political and financial resources, the Americans have not succeeded in inducing the natives to notify their sick. It seems that the isolation village will have to be continued, but subject to the condition that the tribal chiefs see that isolation is really enforced and that severe penalties are imposed on negligent or intractable patients.

To sum up, New Caledonia makes very full legislative provision for leprosy. For a long time past the Government has acted on principles similar to those embodied in the resolutions adopted by the Third International Leprosy Conference at Strasburg on July 31st, 1923.

(*k*) Sanitary Police.

The colony is protected against pestilential diseases like plague, smallpox and yellow fever, capable of being imported from overseas, by measures published in the Decree of June 7th, 1922, which was promulgated in the colony. The port of Noumea, in particular, is provided with a quarantine hospital, situated on the little island of Freycinet and perfectly isolated. It is due to this hosptial that New Caledonia alone of our colonies escaped the influenza scourge of 1918-1919.

(*l*) Budgetary Credits (1924).

Share of the Public Health and Medical Services :

Local Budget	Staff	Material	Total	Percentage
11,288,940	237,682	506,381	744,063	6.59

Annex.

Wallis Archipelago and Futuna.

The Wallis Archipelago and Futuna, which are dependencies of New Caledonia, are separated from it by more than 1,100 miles. They have been under French protection since 1844.

They have 5,649 inhabitants, 4,161 belonging to Wallis and 1,488 to Futuna. The natives are of Maori race. A French doctor appointed to Wallis was formerly responsible for the medical service of these islands, and after a very long break this practice has been resumed. While representing a saving for the administration, it is calculated to give the best results from the point of view of the protection of this interesting community against the scourges which impede its development : *leprosy, tuberculosis, venereal disease*, etc.

Budgetary Credits 1924.

Local budget	Staff	Material	Total	Percentage
86,450	1,800	5,000	6,800	7.86

C. NEW HEBRIDES.

(*a*) General Survey.

The New Hebrides are situated between 21° and 13° south latitude, and include some forty islands, of which the most important are the Islands of Torres and Banks in the north, and the New Hebrides, properly so called, in the south. Their total area may be estimated at 1,500,000 hectares.

These islands were discovered by Bougainville, Cook and La Pérouse, and were annexed in 1853, together with New Caledonia. French troops occupied them in 1836. On November 16th, 1887, and January 26th, 1888, Conventions were concluded between France and Great Britain, establishing a French and British *condominium*.

The climate of the New Hebrides is hotter and less healthy than that of New Caledonia.

The soil is very fertile. The principal town is Port Vila, which has a regular monthly steamboat service connecting it with Noumea and Australia.

The archipelago has a population of 60,000 or 70,000 natives distributed in some forty islands and islets. Two-thirds of them live in still practically savage tribes in the interior of the country, that is to say, beyond the reach of any possible action by the medical service. The *condominium* system, which was maintained by the Protocol signed in

London in 1914 and promulgated in 1922, left to each of the signatory Powers the duty of organising the public health and medical services. Only the maritime health police system is organised by the Powers jointly. France maintains a hospital at Port Vila, with a Colonial Army medical officer, head of the Health Service, and several hospital assistants or nurses. A civilian doctor living on the Canal du Segond is responsible for medical work in this part of the archipelago, where many French colonists have settled.

(*b*) Budgetary Credits.

Appropriations for the Public Health and Medical Services :—

Local budget	Staff	Material	Total	Percentage
654,600	58,639	75,570	134,209	22.18

(*c*) Health Personnel.

Europeans :

Civilian doctors :	belonging to the Relief Service	1
	engaged by contract	—
	private	—
Colonial doctors :	unattached	1
	Total :	2
Chemists		—
Hospital assistants :	civilian	1
	colonial	—
	Total :	1
Nurses :	Civilian	4
	Colonial	—
	Total :	4

Natives :

Hospital assistants	4

(*d*) Endemic Diseases.

Malaria, which does not exist in New Caledonia, is very rife in the New Hebrides. *Hemoglobinuric gall fever* is not uncommon. Nevertheless, colonists can live for fairly long periods on the islands, provided they go for change of air from time to time to New Caledonia.

Tuberculosis, *dysentery*, *yaws*, *phagedenic ulcers*, *beri-beri* and *venereal diseases* are the complaints most commonly found among the natives. Leprosy exists, although much less common than in New Caledonia.

D. FRENCH SETTLEMENTS IN OCEANIA.

(*a*) General Survey.

The settlements are situated far out in the Pacific Ocean 5,000 kilometres from the nearest mainland.

With their 31,703 inhabitants, they compose several groups of islands corresponding to administrative divisions and medical districts :—

(1) The Tahiti-Moorea group,
(2) The Leeward Islands group,
(3) The Marquesas group,
(4) The Tuamotu Archipelago,
(5) The Gambier or Austral Islands.

All these settlements in Oceania form a single government, under a Governor residing at Papeete and assisted by a small council.

The soil of these islands, the area of which is 400,000 hectares, is very fertile. Bananas, coconuts, bread-fruit, oranges, cotton, vanilla, coffee and sugar-cane are grown. The mother-of-pearl and pearl fisheries are the main industries of the natives of Tuamotu.

In short, the French settlements in Oceania are mere specks in a boundless sea. They appear as delightful spots where life flows pleasantly and easily amid a charmingly indolent people, bathed in a luminous atmosphere in which the most beautiful mountain scenery is accompanied by magnificent views of the sea.

(*b*) Medical Relief Service.

The dispersion of the island groups over a vast area calls for a fairly large number of doctors in order to develop a Native Medical Relief Service and to combat the factors of depopulation. The question of numbers is therefore of primary importance.

The Public Health and Medical Services are directed by a head of the Health Service (a Colonial Army medical officer, first-class) who resides at Papeete and is at the same time responsible for hospital work in the capital. He is assisted by a resident doctor and an Army chemist. A civilian doctor is in charge of sanitation and prophylaxy, the lunatic asylum, the leper-hospital, the prison, the schools, the quarantine hospital, etc. A doctor has been appointed to Taravao. He looks after Taiarapu and visits the Tuamotu (especially in the diving season) and Moorea. On this island a retired Army Medical Hospital assistant gives first-aid and issues the commoner medicaments.

On the Leeward Islands there are a doctor and a nurse at Uturoa, and small dispensaries at Hua-hive and Bora-bora.

On the Marquesas Islands, the medical work is done by a doctor who lives on the island of Hiva-oa (south-east group). He has an infirmary and a leper-hospital. There is another doctor on the island of Nuka-Hiva (north-west group). Each of these doctors visits the islands within his district, a motor-boat being placed at his disposal.

In 1924 a Colonial Army doctor was appointed to the Gambier Islands.

In addition to the hospital at Papeete, which has recently been furnished with a bacteriological laboratory and an X-ray apparatus, the health institutions also include a number of dispensaries attached to the different medical stations on the islands. The hospital at Papeete, with its 45 beds, is too small for the number of cases. It is an old building badly situated. It will have to be rebuilt before long.

On the little island of Motu-Iti the colony has a quarantine station in good condition, which is to be provided with a sulphur room. There is also a Clayton apparatus mounted on a barge.

Syphilis, tuberculosis, elephantiasis and *leprosy* are deplorably rife among the native population. Numerous measures has been taken against these diseases—frequent medical tours, establishment of dispensaries, plentiful distribution of medicine, advice widely given by doctors during their visits, propaganda by tracts and posters and public work in connection with sanitation, such as improvement of the water supply and the segregation of lepers in the village of Orofara (Tahiti).

The population, which numbered 30,873 in 1907, was 31,703 in 1921. This increase is the more remarkable in that it was maintained during the period between 1911 and 1921, although important causes of depopulation, like the influenza epidemic of 1918 and losses in the war, were at work during those years. This increase in population does not apply to the Marquesas. There the race continues to decline and the birth-rate to fall. The chief reasons lie in inter-marriage and the deplorable sanitary habits of the people.

(*c*) Morbidity and Mortality in 1923.

A. *In hospitals.*

The Papeete hospital : 392 cases (84 Europeans, 308 natives). Number of days' treatment = 12,593.

The principal diseases recorded : influenza (25 cases), yaws (43), tropical ulcers (33), tuberculosis and venereal diseases. The last are at all times very prevalent in Tahiti. They are responsible for 90 hospital cases, or 23 per cent of the total cases received, and for 2,873 days' treatment. An anti-venereal dispensary was opened at Papeete in October 1923.

B. *Outside hospitals.*

1. *Tahiti-Moorea Group.* — Yaws, tropical ulcers, syphilis and tuberculosis are the most important of the local diseases. The campaign against yaws by means of intravenous injections of arsenic is very well received by the natives. Lectures have been given locally and tracts distributed dealing with the venereal danger.

(2) *The Leeward Islands.* — Venereal diseases are the most prevalent complaints. A census of lepers resulted in eight being sent to the leper hospital at Orofara.

(3) *The Marquesas Islands.* — The health situation has been bad in the South-Eastern Group. The death rate has been high among young children and the prospects for the future may be judged from the fact that, as against 123 deaths, there were only 37 births.

Tuberculosis is the main cause of depopulation in these islands. Among other diseases should be mentioned elephantiasis and lymphangitis of filarial origin. A violent epidemic of influenza occurred during September.

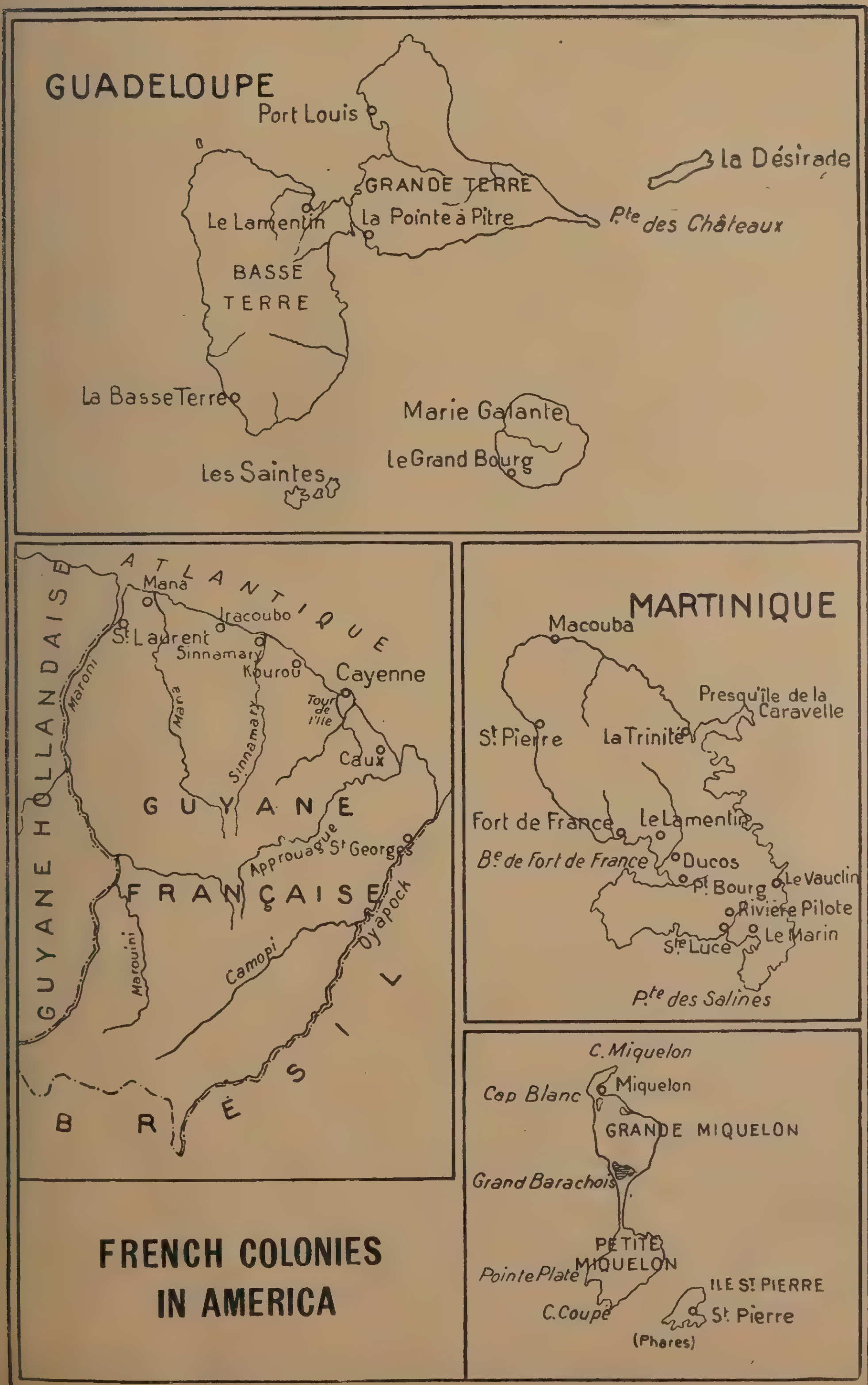
The North-Western Group has a population of 1,000. The doctor has a dispensary at Taiohao with a motor-boat for visiting his sector. Tuberculosis takes heavy toll in this group.

There are about 40 lepers in the Marquesas Islands, twenty of them isolated at the leper hospital of Puamau. When the construction of the leper hospital at Atuana is completed, all lepers in the archipelago will be sent there.

(4) *The Tuamotu Islands.* — During the mother-of-pearl fishing season an epidemic of pulmonary influenza broke out, chiefly affecting the Island of Hikuoru, and the disease spread rapidly owing to the busy coasting trade during the diving season.

(d) Morbidity and Birth-rate at Papeete.

The figures for deaths and births can only be given for Papeete. These are : 223 births and 115 deaths in 1923, that is to say, an excess of 108 births. Owing to the outbreak of influenza, this figure is lower than the 1922 figure, which was 114. Deaths were mainly among infants, 57 being children under 10 including 21 still-births. The lack of sanitation, tuberculosis and syphilis are the principal factors in the prevalence of disease.



FRENCH COLONIES IN AMERICA

CHAPTER II.

ATLANTIC GROUP.

A. Martinique. — B. Guadeloupe. — C. French Guiana. — D. French West Africa. — E. Cameroons (Mandated Territory). — F. French Equatorial Africa. — G. Togoland (Mandated Territory). H. Islands of St. Pierre and Miquelon.

A. MARTINIQUE.

(*a*) Geographical Survey.

Martinique is situated in the Lesser Antilles and forms part of the Windward Islands group. It lies almost opposite the Panama Canal, between the two British islands of Dominica to the north and St Lucia to the south.

It has an area of 987 sq. kilometres. Its extreme length is 70 kilometres and its mean breadth is 31 kilometres. Its mountain system consists of two main ranges, one to the north and the other to the south, joined by a small and much lower chain. All these mountains are volcanic in origin. The island is watered by numerous small streams and it also possesses several thermal springs.

(*b*) Climate.

The climate is warm and moist on the coast, but rapidly becomes drier as the altitude increases.

The year is divided into three distinct seasons, the cool season, the warm dry season and the warm rainy season. The cool season begins in December and ends in March, the thermometer varying between 21° and 32.7° ; the warm dry season lasts from April to July, the temperature varying between 22° and 31.8° ; the warm rainy season begins about the middle of July and lasts until November. It is characterised by great and oppressive heat, storms, hurricanes, torrential rain and sometimes great tidal waves ; the temperature ranges between 25° and 31.4°.

The island is periodically ravaged by cyclones and earthquakes.

Fort-de-France, the capital of the colony, is a town of 30,000 inhabitants, with regularly laid out streets and a rich vegetation.

(c) Population.

In 1921 Martinique had a population of 244,439 ; the mean density of population is 248 inhabitants per square kilometre.

The indigenous race, the Caribs, have completely disappeared long since, and their place has been taken by Europeans, blacks and cross-breeds between the latter two races. There are still a few survivors of the Indian immigrants introduced into the colony between 1855 and 1862.

(d) Economic Survey.

The principal crop grown in Martinique is the sugar-cane, the area under cultivation being 30,000 hectares. The quantity of sugar-cane exported annually amounts on the average to 35,000 or 40,000 tons.

Coffee is still produced though only on a small scale ; in the last five years the average exports have not exceeded 8,000 kilograms. The cultivation of cocoa, however, is on the increase, the quantity of beans exported in 1923 amounting to 685 tons.

Pineapples are also grown, and are used for preserving purposes, and also lemons, for the production of lime juice and citrate of lime.

The most important industry is the manufacture of rum, of which as much as 145,000 hectolitres were exported in 1922. The local consumption amounts to some 45,000 hectolitres, or more than five litres per head.

In 1922 the total trade figures were 161,205,002 francs.

(e) Health Organisation.

The system of public relief in Martinique was recently reorganised by the Decree of June 30th, 1923.

There is a Director of Public Relief who settles administrative questions in direct consultation with the Secretary-General of the Government, while the Director of the Public Health Service acts as technical adviser to the latter.

The cost of public relief is borne by the communes and the local budget. Every necessitous patient is entitled to treatment free of charge, as are also wounded ex-soldiers, and war cripples and invalids not already entitled to free treatment in virtue of their medical certificate. During confinement women are classed as sick persons.

Each commune has a Public Relief Office which every year prepares a list of persons entitled to free public relief.

The Medical Service comprises dispensary consultations and, if necessary, visits to patients at their own homes. Five hospital districts have been formed, namely, Fort-de-France, Le Lorrain, La Trinité, Saint-Esprit and Le Marin.

The Decree of June 30th, 1923, also provides for public relief for the aged and infirm, and for incurables. The recipients either live in their own homes and receive a grant or are admitted to hospital.

(*f*) Health Personnel.

The head of the Martinique Health Service is a Senior Medical Officer of Colonial Troops, who, besides acting as Director of Health, is also technical adviser to the Director of Public Relief and Director of the Health Service of the troops in the Antilles Group (Martinique, Guadeloupe and Guiana).

There are also two other military doctors in the Medical Relief Service ; one, the resident surgeon of the Colonial Hospital, is also in charge of the medical inspection of ships, while the other is Director of the Health Institute of Fort-de-France.

For the medical requirements of the populations of the different communes there are nineteen civilian doctors.

(*g*) Health Institutions.

There is at Fort-de-France a Colonial Hospital, built in 1840, which during the war accommodated as many as 200 patients at a time. It is open both to officials and to private patients of either sex ; the number of patients is increasing every year.

A centre for the equipping and special training of war cripples has been attached to the colonial hospital.

There are also five hospitals in Fort-de-France, Le Lorrain, La Trinité, Saint-Esprit and Le Marin. Further, temporary hospitals are provided for rural centres in which there is a resident doctor, and also dispensaries. These independent units are under the administrative control of the public relief offices.

(*h*) Results.

Until the issue of the latest decree reorganising public relief, the civilian doctors allotted to the various communes attended necessitous persons and the patients in the hospitals, but were not subject to any administrative control and did not send in periodical reports or prepare statistics. Under the new regulations, however, the head of the colony is kept regularly informed as to the condition of public health and also as to morbidity and mortality in the different localities.

(*i*) Institute of Public Health and Prophylaxy.

This establishment, organised for scientific purposes at Fort-de-France, is in charge of a Senior Medical Officer of the Colonial Troops, who studied for a considerable period at the Pasteur Institute at Paris.

In 1923 the personnel of the Public Health Institute carried out in all 1,335 disinfections of premises at Fort-de-France and in the various communes. It distributed 40,360 doses of smallpox vaccine from the Animal Vaccine Institute at Paris ; the doses consisted partly of glycerined lymph and partly of dry vaccine prepared locally. This vaccine gave 98 per cent of successful first vaccinations.

185 phials of anti-streptococcic serum were distributed, and 271 phials of anti-tetanus serum.

At the *Preventorium Colonial* attached to the Public Health Institute, the number of consultations was 6,238 and the number of intravenous injections given 819.

(*j*) Endemic and Endemo-epidemic Diseases.

1. *Malaria* is of rare occurrence at Fort-de-France. The only places in the colony where cases are found are Le Lamentin, Le Marin, Le Diamant, Le François and Le Robert. Moreover, the forms of the disease are not at all serious and yield readily to treatment ; cases of enlargement of the spleen or malarial cachexy are entirely unknown.

2. *Yellow fever*, once so greatly dreaded in Martinique, need only be mentioned as a matter of form ; no case has occurred for many years.

3. *Intestinal parasitism* is very common, particularly among the native population ; the parasites found are in order of frequency ; trichocephali, ascaris, ankylostomæ and bilharzia. Dr. Noc, at the prophylactic dispensary, counted 53 cases of ankylostomæ in 225 persons examined. One of his patients, given thymol treatment, evacuated 554 specimens of *necator americanus*. Out of 464 black, mulatto or creole soldiers, Leger found 382 cases of helminthiasis, including 296 with ankylostomæ.

4. *Filariosis* is extremely common, and cases of elephantiasis are by no means rare. The same may be said of yaws and phagedenic ulcers.

5. *Leprosy* is not very common in Martinique ; it is found principally in the district of La Trinité. Until recently persons ascertained to be suffering from leprosy were isolated in the leper-hospital on La Désirade, a small islet situated at a distance of six leagues from the town of Pointe-à-Pitre (Guadeloupe), where they were attended by a doctor attached to the establishment. For the last two years, however, only crippled or infirm lepers have been sent there. Persons suffering from non-infectious forms of leprosy are treated by the doctors of the Medical Relief Service, either at their free consultation rooms or in hospital. Those suffering from infectious forms of leprosy are placed in hospital and treated in special wards until their lesions have healed. Children must be isolated from their parents immediately after birth.

The new forms of treatment (ethylic ethers of Chaulmoogra oil with or without iodine, hyrganol, " éparseno ") have given definite and very encouraging results.

6. *Tuberculosis* is fairly common, as are also *venereal diseases*. To combat them arrangements have been made for free consultations in all localities where there are doctors.

(*k*) Epidemic Diseases.

An epidemic of *alastrim*, a disease resembling smallpox, broke out for the first time at Martinique in 1923. The number of persons attacked was about 6,000. It was found that Jenner's vaccine provided definite immunity from the disease.

(*l*) Maritime Health Service.

At Fort-de-France this service is under the Director of Public Health, assisted by a medical officer for the inspection of ships ; in other ports of the colony it is in charge of a public health official.

The lazaret at Fort-de-France, which has a Clayton apparatus, has been fitted up for the isolation and treatment of sick persons who have been ordered to go into quarantine.

(*m*) Sanatorium.

Lastly, there is a sanatorium at Balata, in the neighbourhood of the capital, at an altitude of 438 metres, which can easily be reached by a good road. The mean annual temperature there is 22.7°. This sanatorium is on the same isothermic line as Cairo, whereas Fort-de-France is on that of Calcutta. Colson Camp, at a height of 520 metres, is a very suitable spot for a sanatorium.

B. GUADELOUPE.

(*a*) Geographical Survey.

Guadeloupe, which has an area of 1,780 square kilometres, forms part of the Lesser Antilles or Windward Islands. It is divided into two parts by a small arm of the sea called the Rivière Salée, which is about 11 kilometres in length and varies from 30 to 120 metres in width ; its depth nowhere exceeds five metres. The part of the colony situated east of the Rivière Salée is called the " Grande-Terre " ; the other is the " Basse-Terre ", or Guadeloupe proper.

Basse-Terre, which is of volcanic origin, is traversed from north to south by a mountain chain, the two principal summits of which are Sans Toucher (1,480 metres) and La Soufrière (1,484 metres), which is still

active. It is watered by more than 80 streams, of which only three are navigable.

Grande-Terre is in the form of a triangle with the apex to the south-west ; its general configuration is flat, broken by a few low rounded hills. It is watered only by small streams, which, however, become torrents during the great rains.

The dependencies of Guadeloupe are the islands of Marie-Galante (area 14,932 hectares) ; the island of La Désirade (area 3,078 hectares) ; the Saintes Group, composed of eight islets ; the island of St. Barthélemy (area not more than 2,450 hectares) ; and, lastly, the island of St. Martin, of which the French only occupy two-thirds (5,177 hectares), the rest belonging to the Netherlands.

The principal towns are Basse-Terre (population 8,318), the capital of the colony ; Pointe-à-Pitre (27,679 inhabitants), the port of which has a very safe anchorage and is the commercial centre of the island ; and Moule (population 15,279), 28 kilometres from Pointe-à-Pitre.

(*b*) Climate.

The climate is mild and the heat not excessive ; the mean temperature is 26°, and the maximum hardly ever exceeds 36° or 37° ; in the higher parts the thermometer falls as low as 5°.

There are three seasons, namely, the cool season (December to March), the warm dry season (April to July) and the wet or winter season, when the rainfall is very heavy, particularly at Basse-Terre. In this season also hurricanes occur, which at times are very violent and destructive.

(*c*) Population.

Guadeloupe has a population of 212,000. The inhabitants are in part descendants of French or foreign colonists who settled in the islands at different times, and in part descendants of negro slaves brought from the coast of Africa. The union of whites with negresses has produced the mulattos, or people of colour, amongst whom are also included mestizos, the offspring of unions with Indian labourers. The last of the Caribs, the real natives of the Antilles, disappeared some thirty years ago. They were almost entirely exterminated during the 17th century, the only survivors being a few families who took refuge on the cliffs of Bertrand Bay and Grande Vigie Point. Some of them intermarried with other families, which still show traces of Carib blood.

(*d*) Economic Survey.

The principal source of wealth in Guadeloupe is the cultivation of the sugar-cane. The finest plantations are those in the great plains of the

coastal region, where the warmth and moisture are specially favourable to the growth of the sugar-cane. The area under cultivation is about 31,000 hectares.

Coffee planting has declined in importance, but the annual exports still amount to 800,000 kilogrammes.

The cultivation of cocoa is very remunerative, and 900,000 kilogrammes of cocoa-fat are exported annually.

Mention should also be made of vanilla (30,000 kilogrammes), manioc, pineapples, citrons, etc.

The quantity of sugar annually exported to France amounts to 254,000 quintals, and of rum and tafia 90,000 hectolitres.

(*e*) Health Organisation.

The Public Relief Service was reorganised by a Decree issued by the Governor on September 23rd, 1921. It is administered by the head of the colony; the cost is borne by the communes and the local budget.

Each commune has a Public Relief Office, which prepares, under various categories, lists of necessitous persons entitled to free medical attendance at their homes or in hospital. Women during confinement are classed as sick persons. The Governor, acting on the proposals of the Mayor, appoints doctors in the different communes to give medical treatment to patients in their homes and to see them at dispensaries.

Children who have been abandoned, and pauper orphans, are placed under the guardianship of the Public Relief Office, the cost of their upkeep being provided by contributions from the commune concerned and the colony.

The assistance granted to the aged, to the infirm and to incurables usually takes the form of outdoor relief.

Lastly, the Public Relief Service possesses a lunatic asylum at St. Claude and the leper-hospital on the island of La Désirade, which is also used for lepers from Martinique.

Besides the Public Relief Service, there is also a Public Health Service in each commune, comprising (1) a Public Health Office and (2) a Public Health Board.

(*f*) Medical Personnel.

The duties of the head of the Guadeloupe Health Service are carried out by a Senior Medical Officer (First-class) of Colonial Troops.

The various Public Relief Services include sixteen civilian doctors and an assistant medical officer (first-class), who is in charge of the recently established bacteriological laboratory.

There are 32 pharmaceutical chemists in the colony.

(g) Health Institutions.

Guadeloupe possesses a hospital at Pointe-à-Pitre, another at Camp Jacob, and three communal infirmaries, at Basse-Terre, Grand-Bourg and Saint-Martin. In the various communes there are also temporary medical stations, which are independent units administered under the Public Relief Offices.

(h) Results.

In 1921 the number of patients treated at the two hospitals of Pointe-à-Pitre and Camp Jacob was 752, the total number of days' treatment in hospital being about 13,000.

(i) Endemic and Endemo-epidemic Diseases.

1. *Yellow fever*, once the scourge of the colony, need now only be mentioned and no more.

2. Outbreaks of *malaria* are numerous, but take a mild form in the higher districts. The case is different, however, in the part of the island known as Grande-Terre. There are no mountains here, the surface being only slightly undulated, and in the intervening depressions every village and sugar plantation has its marshes, large or small, which are ideal breeding-grounds for mosquitos. Remittent bilious attacks are common in this part of Guadeloupe, and take very serious forms. Hæmoglobinuric gall-fever and pernicious attacks also occur.

Children living at Pointe-à-Pitre are subject every year to attacks of a fever locally termed *fièvre à vomissements noirs* (black vomit fever). This malady, the death-rate from which is very high, usually makes its appearance in May or June, just before the warm rainy season. The attack is insidious ; the children usually reveal a pronounced congestive condition with a temperature as high as, and sometimes higher than, 40°. No pain is felt in the liver or spleen. The chief early symptom is nausea, the patient being unable to retain any food. Even the smallest quantity of liquid is brought back in a few moments. This condition lasts for some hours or even days, and is followed by the " black vomit ", which is regarded as the last stage of the disease and as a fatal symptom.

The vomit itself is mucous and transparent, and is more or less full of blackish striations, of the colour of coffee-grounds. In some cases blood, almost pure, is found. As soon as the black vomit appears, the face of the patient changes, the features become drawn, the nose pinched, and a more or less pronounced jaundice appears ; this is even more marked after death, which follows upon collapse.

Dr. Perrot, who has observed a number of cases of black vomiting, notes that this malady only attacks children below the age of twelve, and

that a first attack does not confer immunity. He thinks that " this affection is not contagious and has no connection with yellow fever. Although not exclusively malarial, it seems to require for its development soil prepared by malaria, and should accordingly be classed in the category termed by Le Dantec ' para-paludal fevers '[1] ".

3. Outbreaks of *filariosis* are frequent in the colony, particularly in Grande-Terre, a marshy part of the island. Hæmatochyluria, chylocele, adenolymphocele and lymphatic abscesses are frequently found both among the white Creoles and among negroes of all shades. It is estimated that a quarter of the entire population of Grande-Terre and Pointe-à-Pitre suffers from elephantiasis to a greater or lesser extent.

4. *Yaws* occur sometimes and in certain parts, in the form of regular epidemics.

5. *Leprosy* is fairly common in Guadeloupe, and indeed has been observed there ever since the beginning of the French occupation. As early as 1728, steps were taken to establish a leper-hospital for the isolation of patients, the spot chosen being the islet of Désirade. Between January 1st, 1859, and December 31st, 1899, 380 lepers were admitted to this hospital. Children are separated from their mothers immediately after birth and taken to the hospital. Nevertheless, on account of the difficulty of artificial feeding during the first months, the child is given the mother's breast (which has first to be carefully washed) about every three hours ; the nipple is covered with a rubber teat, which is constantly kept aseptic. The child also is completely covered with an overall, and does not come into direct contact with the mother's skin : it is removed immediately after having been suckled. The weaning age is six months.

6. The only disease which can be classified under the heading *tuberculosis* is specific chronic bronchitis, which causes great havoc in Guadeloupe. Among the contributory causes of the spread of this disease special mention should be made of alcoholism.

7. Owing to the extent to which prostitution is allowed, *syphilis*, introduced by merchant vessels' crews of all nationalities, finds very favourable soil for its development in Guadeloupe. It is particularly widespread at Pointe-à-Pitre, the port of call for these vessels. The establishment of an anti-venereal dispensary will be a most useful step.

(*j*) Maritime Health Service.

This service is under the direction of the Principal Officer of Health and the public health officials resident in the principal ports of the colony.

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[1] Perrot : " *Black Vomit Fever among the Creole Children of Guadeloupe* " (*Annales d'Hygiène et de Médecine coloniales, 1904*, page 529.)

There are two lazarets, one in the Saintes Islands, which has very large buildings and is used more especially for persons ordered into quarantine and actually suffering from infectious disease ; the other, on the islet of Cosson, is used for the isolation of persons in quarantine under observation and for the disinfection of luggage and merchandise.

(*k*) Scientific Institutes.

A microbiological laboratory has recently been opened at Pointe-à-Pitre for the further protection of health in the colony. There is also a laboratory in the charge of a pharmaceutical chemist who is specially concerned with agricultural chemistry.

(*l*) Sanatoria.

The oldest of the French colonial sanatoria was opened at Guadeloupe in 1841 and was called Camp Jacob. It stands at a height of 545 metres and is only six kilometres from Basse-Terre. It is at the foot of a still active crater called La Soufrière. The mean temperature is 21.5°.

Other stations have been established on the heights of Petit-Bourg and Sainte Rose and at Trois Rivières and Matouba. The last-named stands 100 metres above Camp Jacob. The mildness of the climate is admirably suited to persons requiring recuperation.

C. FRENCH GUIANA.

(*a*) Geographical Survey.

French Guiana is bounded on the north-east by the Atlantic Ocean, on the north-west and west by the Maroni and its upper tributary the Awa, and by the little-known mountain chain of Tumuc-Humac, and on the south by the River Oyapock. It consists of two entirely distinct regions, the coastal region and the mountain region.

The coastline between the Maroni and the Oyapock is slightly curved and is about 320 kilometres in length. The depth of the territory is about 400 kilometres and its area approximately 88,000 square kilometres, or less than one-sixth of that of France.

The coast is low-lying and muddy, and covered with mangrove forests, and there are a few rocky islands lying not far off the shore ; these are—counting from east to west—the Safety Islands, Enfant Perdu Island, the Remire Islands and, opposite the mouth of the Approuage, the Grand Connetable and the Petit Connetable.

In the lower tracts the forest, which extends over almost all the country, is interspersed with savannah covered with scrub and tall grasses. It was in this region that the first colonist settlements were established. The

higher ground rises by successive folds up to the Tumuc-Humac chain, which has a mean altitude of 1,000 to 2,000 metres.

Guiana has a large number of watercourses, running in general from south to north. In the uplands their course is interrupted by barriers of hard rock and they are thus broken up into a succession of reaches separated from each other by rapids. The chief rivers are the Oyapock, 425 kilometres in length (75 of which are navigable), the Quanary, the Approuage, the Mahuri, the Sinamari, the Kourou, the Mana and the Maroni (length 625 kilometres).

(*b*) Climate.

The chief characteristics of the climate of Guiana are the equitable and rather high temperature and the extreme humidity of the air. At Cayenne, however, the heat is very considerably and pleasantly tempered by steady and fairly strong breezes. There are, moreover, great differences in temperature between the camps in the interior and the coastal region, despite the fact that the mean altitude of the gold-mining districts does not exceed 150 to 200 metres. At Cayenne the night temperature has never been found to fall below 20°, but Levat noted minimum night temperatures of 18° in the placers.

Few countries, in short, enjoy such a constant temperature as is found in Guiana particularly at Cayenne. The mean annual temperature is 28° and the mean monthly temperature never exceeds 31° (in September and October) nor does it fall below 22° (in January and February).

The year is divided into two seasons, the winter or rainy season, lasting from December to June and the dry season from July to November. The transitional periods only last a few days. The mean annual rainfall in Guiana is 3.50 metres.

The quantity of water vapour in the atmosphere is very considerable. The hygrometer almost always stands at about 80 to 90 at Cayenne. During the warmest months it registers 72 to 74.

During the first months of the year, until May, the wind is N.N.E. or occasionally E.N.E. It then changes to S.E., with a tendency towards E.S.E. until October, when it begins to blow from the N.E.

The town of Cayenne (population 11,500), the capital of the colony, is situated at the western extremity of the Island of Cayenne. It has an area of 234 hectares. A large part of the town is built on marshland which has been filled up. The southern outskirts consist of vast muddy savannahs which are submerged for a large part of the year.

(*c*) Population.

The population, according to the census of 1921, is 44,070. Of this number 24,000 are indigenous Indians (Galibi, Caribs and Tipis) ; the

descendants of the negroes brought into the country in the time of the slave trade from the coast of Guinea, and the mulattos, now form a considerable part of the population (about 26,800). The gold prospectors in the forests number approximately 11,000. In the penal settlements there are about 3,500 convicts.

(*d*) Economic Survey.

At the head of the local administration there is a Governor, assisted by a Privy Council composed of the heads of administrative departments. Guiana is divided into fourteen Communes.

The principal crops are bananas, taro, sweet potatoes, yams and manioc, which is used for the manufacture of " couac " and cassava, the staple food of the creoles. Maize, certain kinds of vegetables, fruit trees (mangoes, sapotas, guavas, " pomme d'acajou ", etc.), cocoa, coffee, vanilla, cinnamon, nutmegs, pepper, cloves, pineapples, sugar-cane, etc., are also cultivated.

Guiana has an inexhaustive source of wealth in her forests. Most of the species of timber are perfectly suitable for building and carpentering purposes, and some are invaluable for cabinet-making.

Gold deposits were discovered in the Approuage (1853), Saint Elie (1887) and Inini (1902). At present gold is worked in the basins of all the rivers of Guiana from the Maroni to the Oyapock. In the years immediately preceding the war the average export of gold was 4,000 to 4,500 kilogrammes, but in 1922 this figure had fallen to 1,116 kilogrammes.

In 1923 the general trade figures (imports plus exports) amounted to as much as 76,911,631 francs.

(*e*) General Organisation of the Health Service.

The Medical Service is under the technical direction of the head of the Health Service in the colony, who is a Principal Medical Officer (second class) of Colonial Troops and chief doctor of the colonial hospital at Cayenne. The staff of this establishment also includes a resident doctor who is an army medical officer (second class), and an army chemist, who is in charge of the dispensing department and manages the supplies depôt.

Doctors are seconded from the Colonial Troops to the penal administration, and there are two pharmacists allocated to the penal hospital establishments. An army doctor is in charge of the Institute of Public Health and Prophylaxy at Cayenne.

There are also several civilian doctors at Cayenne.

The health institutions of the colony are:

At Cayenne: The general service hospital, the hospital of Camp Saint-Denis and a private nursing-home kept by the Sisters of St. Paul de Chartres.

At Saint-Laurent du Maroni: a hospital with one section for free persons and one for convicts.

On the Safety Islands: a penal hospital on the Ile Royale, with two sections, for free persons and convicts respectively.

In the prison of St. Jean du Maroni there is a temporary hospital with 57 beds.

There are, in addition, several hospitals in the convict camps and, lastly, a leper-hospital for convicts sentenced to penal servitude for life. This stands on an islet on the Maroni opposite the camp of Saint-Louis.

(*f*) Morbidity and Mortality.

In the year 1923-1924, the number of patients admitted to all these institutions was 1,575 free persons (20,363 days' treatment) and 5,516 convicts (127,872 days' treatment). The morbidity per 1,000 among the convicts (taking the present number) was 891 and the mortality 85.1.

(*g*) Endemic Diseases.

1. The commonest of the group of endemic diseases is *malaria*. In the year 1923-1924 (September to October) 3,061 persons suffering from this disease (including 516 free persons) were given hospital treatment, and 240 died (8 free). Pernicious attacks are by no means rare, the latest statistics (1923-1924) showing 73 such cases, of which 56 proved fatal. The unsatisfactory state of public health in the colony is probably due to the atmospheric conditions; during the intermediate period between the rainy and dry seasons (July and August) a large number of ponds and pools are left which, before they completely dry up, become breeding-grounds for mosquitoes.

The town of Cayenne, where winds blow in all seasons, is almost free from malaria. In most of the cases which occur there the disease is contracted in the interior, and more particularly on the mining camps, where the gold-diggers take no precautions to protect themselves against the bites of anopheles. At the convict-prisons extensive drainage works have been carried out and have considerably improved the health conditions of the convicts, of whom, however, malaria still takes heavy toll.

2. The various forms of *helminthiasis* are very common in Guiana, and particularly ankylostomiasis. At St. Laurent du Maroni the bacteriological examination of the stools of 2,218 convicts gave the following results:

Eggs of ankylostomæ	1,109
" " trichocephales	146
" " ascaris	138
" " bilharzia	5
" " oxyures	1
" " taenia	1

Brimont had previously discovered that, after three years in the penal settlements, convicts were infested with ankylostoma, the proportion being 60 per cent in the Safety Islands, 83 at Cayenne, 86 at St. Jean du Maroni and 90 per cent at St. Laurent. Blin has shown that 71 per cent of the gold-diggers in the interior were carriers of ankylostoma. In 1919 Marcel Léger showed that 95 per cent of the inmates of the penal settlements treated at Cayenne hospital for very different diseases were carriers of helminths in general and that 92 per cent were carriers of ankylostoma. Out of 242 soldiers of the local drafts recently enrolled, 82 per cent have intestinal parasites and 63 per cent uncinaria. Of the worms evacuated or discovered during autopsies, Leger only found *necator americanus*, but the dimensions of the eggs showed that *ankylostomum duodenale* was quite possibly present also.

3. *Filariosis,* with its lymphatic symptoms, is common in Guiana. No race is immune from this endemic affection ; elephantiasis of the limbs, of the scrotum and of the labia majora is frequently observed.

4. *Amœbal dysentery* exists in Guiana. The number of cases diagnosed in the penal hospital of St. Laurent in 1924 was 57, of which 37 terminated fatally. In the same hospital, 16 cases of typhoid fever were found among the convicts in the course of a year; 11 terminated fatally. Mention should also be made of pulmonary tuberculosis, which seems to be increasing; among the convicts there were 142 cases and 75 deaths in twelve months.

5. Special mention should be made of *alcoholism,* which is one of the most harmful habits of the population. The drinking of punch twice a day is a practice common to all classes. According to Dr. Dupuy, principal Medical Officer, statistics show that the average annual consumption of alcohol of 50° strength is 33 litres per head (not counting children under ten years of age).

6. It should be noted that, owing to the lax state of public morals, *venereal* disease is very widespread.

7. *Leprosy.* The present rapid survey of the diseases occurring in Guiana would not be complete without mention of leprosy, which was undoubtedly introduced into the colony by the negroes from the African coast.

According to Clarac, there is no authentic case known of a red Indian being attacked with leprosy, but this disease has claimed victims from all the other races, and not least from whites and mulattos.

The pauper lepers of the colony are isolated in the leper-hospital of Acarouany. The total number of patients treated there was 67 in 1921, 70 in 1922, 72 in 1923 and 86 in 1924. The number of deaths in these four years was 48.

The inmates of this leper-hospital are attended by a doctor residing at Mana, which is in the neighbourhood. The patients are nursed by Sisters of Charity.

At Cayenne, lepers are given treatment free of charge at the Institute of Public Health and Prophylaxy.

The penal administration has established a leper-hospital for its patients on a small island in the Maroni; there were 17 inmates last year.

A measure of success has been achieved by colloidal antimony treatment in the case of patients suffering from maculo-anæsthesic leprosy, but this treatment produced no effect on lepers with ulcers. Iodated æthylic ethers of Chaulmoogra oil have been used, especially of late, in the form of injections; the patients bore this treatment very well and it was not attended with any evil consequences. The treatment was given to 153 patients (466 injections) ; the improvement was particularly marked in cases of macular forms of the disease.

(*h*) Maritime Health Service.

The personnel of this service consists in sanitary guards and police under the authority of the chief of the Health Service, who acts as Director of Health.

Ships are medically inspected at Cayenne, St. Laurent du Maroni and St. Georges d'Oyapock, which are the ports of call. The quarantine station of the colony is at Larivot, near Cayenne; it has a Clayton apparatus.

The sums provided for the operation of this service are fixed in the local budget for 1924 at 24,930 francs.

(*i*) Public Health.

On the whole, epidemic diseases are quite rare in Guiana—a fact which is particularly remarkable since it appears inconsistent with the laxness with which health measures of any kind are carried out.

The epidemic diseases common among children in most other countries (whooping-cough, mumps, chichen-pox, etc.) are quite exceptional in Guiana. The rareness of epidemics is probably due to the fact that very few travellers land in Guiana, which lies off the frequented shipping routes.

In March and April 1924, 13 children were attacked with alastrim at St. Laurent du Maroni—in all cases very mildly.

Under the Regulations of October 6th, 1909, a Colonial Board of Health for Guiana has been appointed and the colony divided into six health areas. Municipal health offices have also been opened at St. Laurent and Cayenne. In the latter town there is an Institute of Public Health and Prophylaxy at which all questions connected with the protection of public health are studied and free treatment is given to all applicants suffering from leprosy, syphilis, intestinal parasites, etc.

D. FRENCH WEST AFRICA.

(a) Geographical Survey.

French West Africa has an area of 3,500,000 sq. kilometres, lying almost entirely within the two large loops formed by the Senegal and the Niger, except as regards the Sahara side of the latter—Mauretania, Sahel and the territories of Timbuctoo and Zinder. Both rivers rise in the mountain range of Fouta Jalon. The Senegal, after receiving its tributaries, the Baule and the Falemé, reaches the sea at Cape Verde ; and the Niger, whose chief tributary is the Bani, flows into the Gulf of Guinea. The chief towns situated on the Senegal are Bafulabe (at the confluence of the Baule and the Bafing, which unite to form the Senegal), Medine, Kayes, Bakel, Matam, Saldi, Podor, Dagana ; and the principal towns on the Niger are Kulikoro, Segu, Sansanding, Djenné (on the Bani), Mopti, Niafounke, Kabara (near Timbuctoo), Gao, Niamey and Say, at which point the river leaves French territory and enters British Nigeria.

The Atlantic Coast from Port-Etienne to Porto Novo is not all under the sovereignty of France. There are a number of foreign enclaves (British Gambia, Portuguese Guinea, Sierra Leone, the Republic of Liberia and the Gold Coast), but all the French coastal colonies—Senegal, Guinea, the Ivory Coast, Togoland, Dahomey—are largely dependent upon their common hinterland.

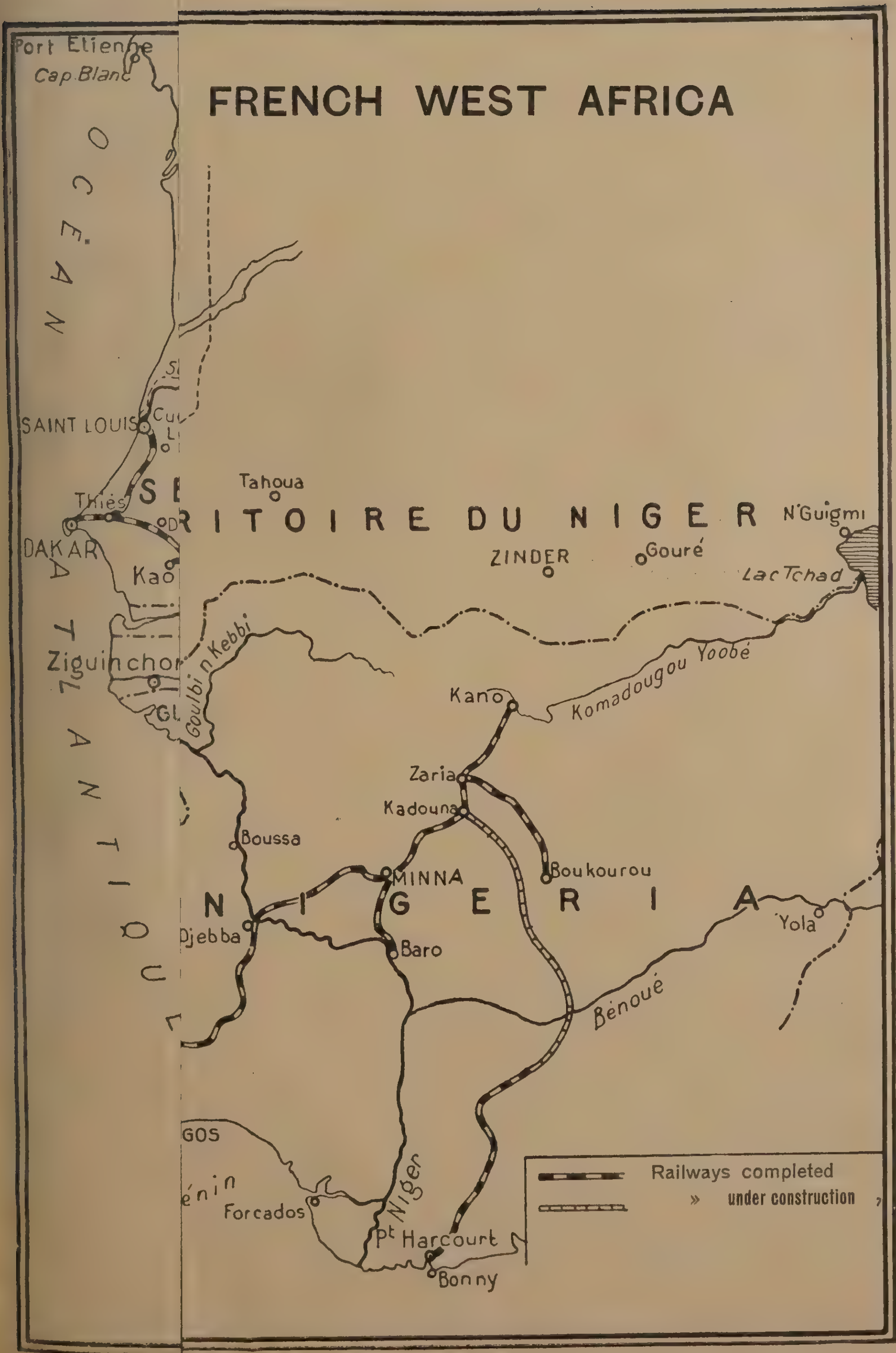
Among the principal rivers mention should also be made of the Cavally, the Sassandra, the Bandama, the Comoe and the Volta, which flow south into the Gulf of Guinea. At flood time the Senegal can be ascended as far as Kayes by steamers of large tonnage. The Niger is navigable throughout the year for barges of small tonnage, and during the flood period by steamers of 100 tons, including cargo. The land flooded by this river during the winter season has an area of 100,000 square kilometres, and resembles an inland sea.

The coast-line is of very varied character. From Cape Blanco to the estuary of the Casamanco it is sandy ; in Guinea it is rocky and indented, and on the Ivory Coast and in Dahomey it is fringed with lagoons.

French West Africa is comparatively flat. There is a mountainous region, however, in Guinea, extending from Fouta Jalon to the country of Kong. This is the healthiest part of the colony, where sanatoria might be established.

(b) Climate.

The climate of French West Africa has all the features of a tropical region—excessive heat and moisture, hot sun and sudden barometric depressions. There are two seasons, the so-called winter, characterised by torrential rain, lasting from the beginning of June to the end of October, and the


FRENCH WEST AFRICA
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OCÉAN ATLANTIQUE
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Thiès
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RITOIRE DU NIGER
N'Guigmi
ZINDER
Gouré
Lac Tchad
Goulbi n Kebbi
Komadougou Yoobé
Kano
Zaria
Kadouna
Boussa
MINNA
Boukourou
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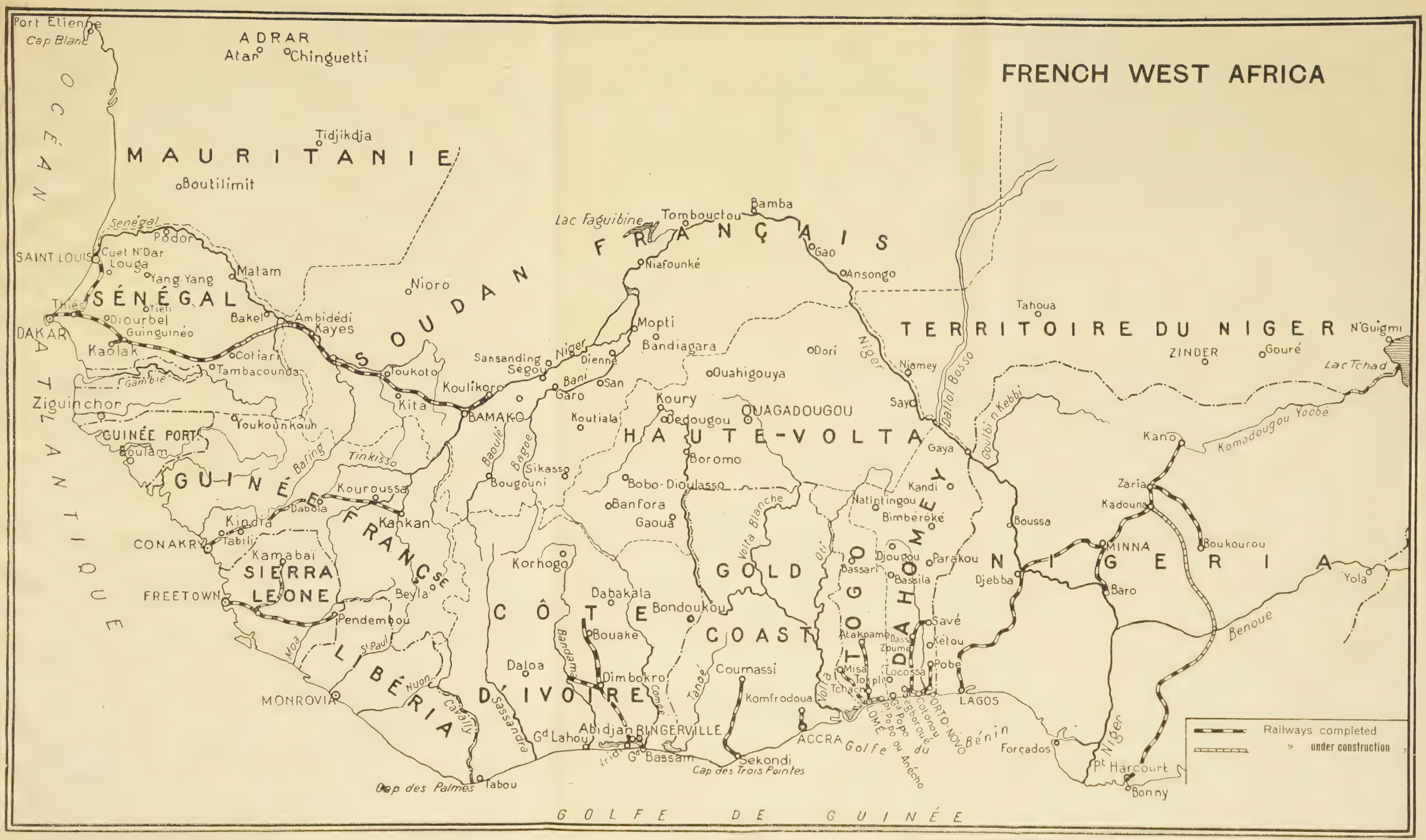
FRENCH WEST AFRICA
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Senegal
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SAINT LOUIS
Cuet N'Dar
Louga
Yang Yang
Matam
SÉNÉGAL
Thiès
Tieli
Diourbel
Bakel
Ambidédi
Kayes
DAKAR
Guinguinéo
Kaolak
Cotiari
Tambacounda
Gambie
Ziguinchor
GUINÉE PORT.
Boulam
Youkounkoun
Nioro
SOUDAN FRANÇAIS
Lac Faguibine
Tombouctou
Bamba
Gao
Ansongo
Niafounké
Mopti
Bandiagara
Dienné
Sansanding
Ségou
Niger
Bani
San
Garo
Toukoto
Koulikoro
Kita
BAMAKO
Koutiala
Baoulé
Bagoé
Sikasso
Bougouni
Tinkisso
Bafing
GUINÉE FRANÇAISE
Kouroussa
Dabola
Kankan
Kindia
Tabili
CONAKRY
Kamabaï
SIERRA LEONE
FREETOWN
Beyla
Pendembou
Moa
St Paul
LIBÉRIA
Nuon
Cavally
MONROVIA
Cap des Palmes
Tabou
Dori
Ouahigouya
Koury
Dedougou
OUAGADOUGOU
HAUTE-VOLTA
Boromo
Bobo-Dioulasso
Banfora
Gaoua
Volta Blanche
Korhogo
Dabakala
Bondoukou
CÔTE D'IVOIRE
Bouake
Bandama
Daloa
Dimbokro
Comoé
Sassandra
Gd Lahou
Abidjan
BINGERVILLE
Gd Bassam
Vridi
Tanoé
GOLD COAST
Coumassi
Komfrodoua
ACCRA
Sekondi
Cap des Trois Pointes
Volta
Oti
TOGO
Bassari
Atakpame
Misa
Tchacho
Tokpli
LOMÉ
Pti Popo
Gd Popo ou Anécho
Ségborové
Cotonou
PORTO NOVO
DAHOMEY
Natitingou
Kandi
Bimbéréké
Djougou
Parakou
Bassila
Savé
Kétou
Dassa Zoume
Locossa
Pobe
Gaya
Golfe du Bénin
LAGOS
Niger
Niamey
Say
Dallol Bosso
Goulbi n'Kebbi
TERRITOIRE DU NIGER
Tahoua
ZINDER
Gouré
N'Guigmi
Lac Tchad
Komadougou Yoobé
Kano
Zaria
Kadouna
Boukourou
Boussa
MINNA
NIGERIA
Djebba
Baro
Yola
Bénoué
Forçados
Pt Harcourt
Bonny
GOLFE DE GUINÉE
Railways completed
» under construction

dry season, in which the temperature may exceed 40° and even approach 50° at places such as Kayes or Poolov. The climate is very trying in the winter season on account of the moisture of the atmosphere and the tornadoes, which at times are of extraordinary violence.

In the south the climate is more or less equatorial, whereas in the north it is more arid, owing to the proximity of the Sahara desert.

(*c*) Population.

Despite its vast area, French West Africa has a population of only 12,500,000—equal to that of Holland and Belgium together—the density of population being about 2.5 inhabitants per square kilometre.

As regards ethnography, the native race is fundamentally of the negro type, with an endless number of variations, ranging from the Wolofs of Senegal, the Soninkes, and the Mandinghes to the Ashantis of the Ivory Coast, the natives of Dahomey and the Haussa traders of Upper Dahomey. In the desert zone are the Moors north of Senegal, and the Tuaregs north of Timbuctoo, the latter being whites of the Berber type. Then there are the Fulas or Peulhs, who live in a scattered and semi-nomadic state and are said to be descended from the Hyksos (robbers), the pastoral Canaanite peoples who came from Syria and conquered Egypt. Driven out later by the Egyptians, some of them found their way to the central regions of Africa, whence they spread gradually even to distant Sokoto and Senegal.

There has been a certain amount of intermixture between these races. The half-breeds of the Fulas and the negroes have produced the Tukulurs, and the Pourognes found along the banks of the Senegal are the descendants of half-breed negroes and Moors. As regards religion they are either fetish-worshippers or Moslems.

(*d*) Economic Survey.

The colony of French West Africa has a Central Government (residence at Dakkar), with eight subsidiary governments, namely : Senegal, the capital of which is St. Louis ; Mauretania, the Lieutenant-Governor of which also has his administrative residence at St. Louis ; the Sudan, capital Bamako ; the Upper Volta, capital Wagadugu ; French Nigeria, capital Zinder ; Guinea, capital Konakry ; the Ivory Coast, capital Abidjean, and Dahomey, capital Porto Novo. In the early days, merchant-ships and chartered companies used to trade with the natives, bartering cloth, coral, yellow amber, etc., for slaves, gum, gold, feathers, etc. Then the natives adopted a monetary system consisting of cowrie shells, bars of iron and French metal currency.

Now oil-bearing plants are the chief product not only of Senegal, but also of Guinea, the Ivory Coast and Dahomey (ground-nuts, oil-bearing palms, karité trees and coconut palms). The cultivation of cocoa has

been introduced and already forms a source of wealth on the Ivory Coast. The forests in that colony cover more than 100,000 square kilometres, the flora being very varied.

Cotton is cultivated in the dry belt by the natives, who raise almost all the cotton exported, except for one private firm in the Timbuctoo district which cultivates Egyptian cotton by means of irrigation.

Labour is usually drawn from the native villages, but economic developments are attracting labourers from the interior towards the coast. Thus some 70,000 Sudanese from Sahel have migrated to Senegal to take up the cultivation of the ground-nut and a large number—estimated at 200,000—of Mossi and Sudanese are seeking employment in the cocoa plantations on the Gold Coast. These are doubtless only temporary movements, which will gradually disappear as communications improve and reach the remoter regions from which the workers are now drawn who, owing to the quickening of economic life in those regions will find work nearer their homes; the demand for head portage will also tend to disappear.

The trade figure for French West Africa in 1923 was 988,464,635 francs. Imports amounted to 542,757,030 and exports to 445,707,605 francs. The colony of Senegal is responsible for the major share of this trade.

Among imports may be mentioned :—

Cotton textiles to the value of . .	181,000,000	francs
Coal	211,985	tons
Rice	17,964	"
Sugar	7,092	"
Wines	62,189	hectolitres
Mineral oil	8,200	tons
Motor-cars	286	vehicles
Salt	13,234	tons

Exports include the following :—

Oil seeds (ground-nuts, palm kernels, karité kernels, copra, sesame seeds, castor-oil seeds)	338,695	tons
Palm oil	22,514	"
Fine woods	67,663	"
Rubber	1,340	"
Gum arabic	3,086	"
Cocoa (Ivory Coast)	3,619	"
Live-stock	9,500,000	francs
Fresh fruit	3,066	tons
Gold	797	kilos
Cotton	1,212	tons
Wool	887	"

The Central Government of the Colony, by arrangement with the Colonial Cotton Association, has just completed a scheme for the organisation of the cotton-growing industry. The Tourcoing Chamber of Commerce, with Government help, is trying to acclimatise the merino sheep of South Africa in Senegal, the Sudan and the Upper Volta.

(*e*) Health Policy.

The carrying-out of the national health policy is a very difficult task, as the areas to which it is to be applied are vast and sparsely inhabited by a scattered population, partly pastoral or nomad, often very backward and at very different stages of evolution. The fact that the population is so small despite the prolificity of the native races, is due to the high rate of infant mortality and the absence of proper hygiene and of prophylactic measures against disease. The public health programme of the colony may be summed up in a few words,—the development of a public health service and the organisation of medical relief at centres where Europeans live and whence one or more resident or travelling medical officers can extend public health measures to the remoter districts ; the use of natives as assistant doctors under the French Medical Officer in charge of the district, for the purpose of spreading health propaganda and for the education of the native communities.

(*f*) General Organisation of Public Health and Medical Services.

The Public Health Services are under a General Inspector of the Colonial Health Service, who resides with the Governor-General at Dakkar and acts as his adviser on medical questions. The Inspector-General of Public Health and Medical Services (who is also Principal Medical Officer of the Troops) is responsible for the application of the public health laws in French West Africa. He has under him a Travelling Director of Public Health, who informs him of any epidemics which may break out. There is a Supreme Public Health and Sanitation Board, which assists the Governor-General in drawing up the various health regulations.

Each of the colonies of French West Africa has a Chief of the Health Service, who is responsible, under the Governor, for the operation of the Medical Service. Each colony also has a Public Health and Sanitation Board, which studies ways ad means of helping the natives and protecting them against infectious diseases.

(g) Budgetary Credits (1924).

Colony	Local Budget	Appropriation for Public Health and Medical Services Staff	Material	Total	Percentage
Central Government of French West Africa	69,000,000	648,264	1,635,405	2,283,669	3.28
Mauretania	5,103,231	112,879	97,500	210,379	4.01
Senegal	30,559,261	1,515,046	1,035,525	2,550,571	8.03
Guinea	16,275,237	817,748	524,020	1,341,768	8.34
Ivory Coast	16,778,280	699,786	311,110	1,010,896	6.02
Dahomey	11,160,000	502,653	236,840	739,493	6.62
Sudan	20,268,600	573,641	425,440	999,071	4.92
Upper Volta	9,546,600	458,523	224,400	682,923	7.15
Niger	5,700,503	179,825	188,035	367,860	6.45
Total	184,791,712	5,508,365	4,678,275	10,186,630	5.53

(h) Health Personnel.

1. *Europeans.*

Civilian doctors :	of the Medical Relief Service	34
	engaged by contract	18
	practising privately	3
Medical officers :	military	14
	General Service	16
	unattached	38
	Total	123
Civilian chemists :	engaged by contract	1
	private	6
Colonial Government chemists :	General Service	4
	unattached	3
	Total	14
Civilian nurses (male)		—
Colonial Government nurses (male) :	General Service	68
	unattached	2
	Total	70
Civilian nurses (female)		5
Colonial Government nurses (female) :	General Service	—
	unattached	11
	Total	16
Midwives		6

2. *Natives.*

Assistant doctors and medical assistants	78
Assistant chemists and chemists' assistants	6
Midwives	53
Nurses (male) : Government	94
Civilian	466
Nurses (female)	13
Vaccinators	65
Sanitary Police	176

(*i*) Public Health Institutions.

Senegal : Dakkar Colonial Hospital (centre for the treatment and training of disabled soldiers).
1 Ambulance station at St-Louis.
1 " " at Gorée.
1 " " at Tiaroye.

Sudan : Secondary hospital at Bamako.
Ambulance station at Kayes.
" " at Timbuctoo.

Public Health Institutions, Local Service.

Dakkar-Gorée (Central Government) : 1 School of Medicine.
1 native hospital with maternity ward (1,000 beds).
1 Social Welfare dispensary.

Senegal : 1 native hospital with maternity ward at St. Louis (100 beds).
2 dispensaries at St. Louis.
14 Medical Relief Centres (1 with sick ward and maternity and 6 with sick ward).

Mauretania : 12 medical relief centres.

Guinea : 1 mixed hospital at Conakry (135 beds).
9 medical relief centres (3 with sick ward and maternity ward and 3 others with sick ward).

Ivory Coast : 9 ambulance stations (3 with maternity wards).
Grand-Bassam,
Bingerville (maternity ward),
Abidjean (maternity ward),
Buaké,
Assandra,
Tabu,
Grand-Lahu (maternity ward),
Aboisso,
Dimboko.
37 small dispensaries at stations which are without doctors.

Dahomey : 3 mixed ambulance stations : Porto-Novo (75 beds).
Grand-Popo (under reconstruction).
Cotonu (30 beds).
3 medical relief centres : Widah.
Abomey.
Kandi.

Sudan : 20 medical relief centres (2 with dispensary and maternity ward and 12 with dispensary).

Upper Volta : 1 native hospital at Wagadugu.
20 dispensaries (6 with sick ward and maternity ward and 6 with sick ward).

Niger : 5 sick wards, at Zinder, Niamey, Bilma, N'Guigmi and Tahua.

(*j*) Scientific Institutes.

Dakkar School of Medicine (native doctors, pharmacists and midwives) :

medical students	66
students of pharmacy	6
students of midwifery	68

Dakkar Pasteur Institute : such biological research work as is necessary for the Colony.

Kindia Pasteur Institute : experimental biological research, especially on monkeys.

Bamako : bacteriological laboratory.

(k) Hospital Statistics.

Number of days spent by patients in hospital	332,820
Number of consultations	1,832,940
Number of vaccinations	1,633,728

(l) Survey of Health Conditions.

1. *Yellow Fever.*

This disease no longer presents the grave danger it used to do. The deadly epidemics of last century need never occur again provided that the old centres of infection are kept under medical supervision, and that the campaign against stegomyias is continued. If several generations of the larvæ of dangerous mosquitoes are destroyed in the European centres once or twice a year, there is every likelihood that any endemic centres which may still exist will be sterilised.

1923.	*1924.*
Dahomey.	*Dahomey.*
1 centre at Woidah—	Bohicon and Woidah
5 cases : 4 deaths	6 cases : 6 deaths.

2. *Smallpox.*

Every colony is provided with an organisation for the prevention of smallpox. There are no fewer than twelve vaccination centres, and public vaccinators go round the whole country at regular intervals. In spite of this, however, occasional epidemic outbreaks of smallpox still occur.

1923.

Guinea.
About 100 sporadic cases.
Upper Volta.
About 100 sporadic cases.
Dahomey.
1,500 sporadic cases—200 deaths.

1924 (first ten months).

Senegal. A number of cases in the districts of Sine-Salum, Matam and Bakel.
Mauritania. Several cases at Adrar.
Upper Volta. A number of scattered centres.
Dahomey. A number of scattered centres.
Sudan. 65 cases in the districts of Ségou, Niamey and Bafulabey.

3. *Plague.*

1923.

Senegal.
1,221 cases—325 deaths.

1924.

Senegal.
1,732 cases—1,100 deaths.
Mauritania.
7 cases—2 deaths.

Plague first appeared in French West Africa in 1914 and Senegal proved a very favourable soil for its propagation.

Since then epidemics have occurrred almost every year, and the economic development of the Port of Dakar has been threatened. As a result of the energetic measures taken, the extent of the disease has been steadily reduced, and it is to be hoped that it will soon completely disappear. Senegal is the only colony in the entire group where plague has occurred.

4. *Relapsing Fever.*

In French West Africa relapsing fever (Obermaier spirocheta) is now raging in the Upper Volta, the French Sudan, and Niger. Some authorities attribute it to the revival of a local virus, but the real cause appears to have been the introduction of the germ by native soldiers from the " field of operations abroad ", who were repatriated *via* Guinea (by rail from Konakry to Kurussa and by water from Kurussa to Bamako). It was, in fact, at the beginning of May 1921 that the bacteria were first found at the depôt of Kati, on the outskiris of Bamako, among laptats (sailors) and native soldiers who were returning home and landed there on their arrival at Bamako.

Endemic centres of relapsing fever have since formed in the French Sudan and the Upper Volta, and the disease has spread far and wide eastwards and has reached, and even crossed, the Niger.

The epidemiological bulletins for 1924 and the beginning of 1925 give the following information :—

In the period January-September the Upper Volta was little affected by the disease, which reappeared, however, in October in epidemic form. 326 cases were found in the Fada district, 66 proving fatal, and a few cases at Dori ; in November there were 197 cases (52 deaths) ; in December there was a small outbreak at Tugan (district of Wagadugu), though none of the cases proved fatal. There were 28 deaths at Kudugu.

In the Sudan the position is as follows : in January there were 191 cases at Kutiala and 2 at Timbuctoo (55 deaths) ; February : 19 cases at Hombori and 36 at Kutiala ; March : 34 cases at Kutiala ; April : 17 cases at Kutiala (4 deaths) ; May : infection centres in the districts of Bamba, Kutiala, Segu and Gao ; June : 27 cases at Segu, 1 at Gao, and 1 at Kutiala ; after June little was heard of the disease until December, when 27 fresh cases were reported.

In the Niger territory it appeared in March in the districts of Tahua, Niamey, Dasso and Kami, where it caused 500 deaths. In face of this imminent danger, delousing centres were established on the main road leading to uninfected areas. The disease died down in May, June, July and August, but reappeared in September. In October there was a severe epidemic in the districts of Zinder and Tessua (the main centre) extending

eastwards as far as N'Guimi, and east, west and south of the town of Zinder. In the last-named locality, however, only six cases were reported. Some thousands of travellers passed through the delousing centres which were established at the entrances to the affected centres. A special service for the discovery of cases and a lazaret were organised at Myriah, 20 kilometres from Zinder. There were 2,102 deaths in September and October, and 478 in November. Epidemic centres were still active in December. The only districts which were spared were Bilna, Agadés, Gaya and Niamey.

A more serious matter, however, was the fact that the epidemic followed the pilgrim and caravan routes and continued its advance eastwards, entering the Chad territory *via* N'Guimi, Mao, Mussoro and Abécher on the borders of the Anglo-Egyptian Sudan.

Moreover, on its passage to Mao, it also branched southwards as far as Fort Archambault. According to telegrams received from Brazzaville, the disease appeared in January at Fort Lamy. There were about 100 cases, of which some 30 were fatal. At Abécher there were two cases, at Kanem 200 deaths, and at Massenia in the Baguirmi region, 109 deaths. In February more than 600 deaths in all were reported from Fort Lamy, Fort Archambault, Mao, N'Guri, Bol, Bokoro, Massenia, Buguerra and elsewhere. Since then the epidemic has been on the wane, but at the end of April active centres were still reported at N'Guri in the district of Kanem, in the north of Baguirmi, and even in the north of the Cameroons, at Garua and Marua.

At Fort Lamy relapsing fever first appeared in the prison, then among the district police, among some of the young recruits and particularly among the natives of the villages of Jebal Bahr and Jebal N'Gato.

It would be interesting to know whether the Anglo-Egyptian Sudan has hitherto remained immune from the disease and whether special health agreements on this subject have been reached between that country and the Chad territory for the purpose of checking the spread of the epidemic.

In short, relapsing fever has succeeded in securing a permanent foothold in French West Africa at certain endemic centres which from time to time break into activity and cause deadly epidemics. The general tendency of the epidemic is to advance eastwards and follow the caravan and pilgrimage routes to Mecca ; but the germ, which is carried by lice, infects the sedentary populations who, in their turn, communicate the disease to neighbouring areas. Climatic conditions (cold and rain) cause overcrowding in the native dwellings and thereby favour infection, but the principal sources of infection are the throngs of traders and pilgrims, who spread it wherever they congregate. The main prophylactic measures against relapsing fever should therefore consist in exercising supervision over these large bodies of people and disinfecting them at delousing stations

placed at suitable points on the routes or tracks followed by traders or by emigrants.

It is noteworthy that races which live in a state of nudity except for a loin-cloth, such as the Bobos, Lobis, Nianigués, Yans and others, were spared by the epidemic—a clear proof of the part played by the body-louse as a carrier of relapsing fever.

5. *Epidemic Meningitis.*

Epidemic meningitis was first identified by Marchoux in Senegal in 1899.

It appears every year at the beginning of the cool, dry season and disappears again in the summer. Chills and dust-storms play an important part in the pathogeny of the disease. Another cause favouring its spread is promiscuity and overcrowding ; during the cold season the natives live in hermetically sealed huts contaminated with household refuse, unventilated and without light.

Meningitis takes two different forms according to the region where it occurs.

West of the Upper Niger it takes a mild form and does not become widespread. It appears in a single village or group of villages, but dies out without going further, and the mortality which it causes may be estimated at 1 per cent.

In the loop of the Niger and east of that river, however, it takes a more serious epidemic form, comparable to that of pandemic influenza, the mortality from it being 10 to 15 per cent. In 1907, Neel found in the Lobi country villages where one-fifth of the inhabitants had perished. In the colonies of the Upper Volta and Niger, in 1921, a wave of meningitis spread from British Nigeria to the districts of Niamey and Tahua. It vanished in May, but reappeared during the winter of 1921-1922 and spread eastwards towards Zinder. A fresh outbreak occurred in January 1924, in the district of Zinder. Thus in the space of four years this district was the centre of epidemics of meningitis which were interrupted by the rainy season but broke out again during the cold dry season, and in all appear to have claimed at least 15,000 victims.

Meningococci and pneumococci are considered to be the agents of infection. The two microbes probably act in symbiosis, and thereby increase their virulence and render the disease particularly serious and infectious. Pneumococcal diseases are frequent among the natives during the season when outbreaks of meningitis occur. Thus, in 1916, in the camps of St. Louis, there were 48 cases of meningitis, of which 35 proved fatal, while there were 27 cases of pneumonia.

Owing to the fact that the territory is very large and that the villages lie far apart from each other, the campaign against epidemic meningitis

is peculiarly difficult to carry out in French West Africa, especially as the value of vaccination by polyvalent anti-meningococcous and anti-pneumococcous products has not yet been proved.

The only prophylactic measures which it has so far been possible to apply are the following :

(1) Infected populations, which, when moving from place to place, become very dangerous carriers of the disease, are forbidden to leave their homes.

(2) Infected persons are isolated in huts, either in a group of huts built for the purpose or in an outlying part of the village which has been evacuated and converted into a lazaret.

(3) Nasal-pharyngeal disinfection of suspected persons.

(4) Huts which have housed patients are burned, and personal effects are disinfected by exposure to the sun and the open air.

These measures, when they can be properly applied, have proved quite successful. In 1921 the district of Tillabery and in 1923 that of Zinder were protected in this way, the inhabitants being kept within a fixed area. On the other hand, a serious and widespread outbreak of meningitis occurred in Zinder after an agricultural meeting attended by a large number of persons.

The incidence of the disease in 1923-1924 was as follows :—

1923.	*1924.*
Niger : 1,758 deaths.	Niger : 6,600 deaths in the districts of Zinder, Guré and N'Guigmi, the number of deaths in Zinder itself (population 210,000) being 5,216.
Upper Volta : Sporadic cases.	Upper Volta : 16 cases—6 deaths at Wagadugu, and several cases in the Fada district.
Dahomey : 33 cases, 17 deaths.	Sudan : 8 cases.
	Mauretania : several cases (in the Kaedi district).
	Senegal : 100 cases—56 deaths (Pedor district).

(*m*) Maritime Health Police.

1. *Senegal.*

Health Directorate :	St. Louis.	Chief of the Health Service of the Colony.

Health Areas :	(1) Dakar. Doctor in charge of the hospital—Chief Medical Officer of Health.	There is a lazaret for quarantine and disinfection at Cape Manuel (Dakar peninsula) with steam disinfecting apparatus and sulphurisation chambers. Portable equipment. Clayton apparatus, type B installed on a barge.
	(2) St. Louis. Medical officer in charge of ambulance station—Chief Medical Officer of Health.	Portable equipment. Clayton apparatus, type B, installed on a barge.

Public health stations have been established at Rufisque, Kaolack, Fatick, Zighinchor and elsewhere.

2. *Guinea.*

Health Directorate :	Konakry.	Chief of the Health Service of the Colony.
Public Health Area:	Konakry. Resident doctor at the hospital — Chief Medical Officer of Health.	There is a well-equipped lazaret at Konakry for quarantine and disinfection, including formolisators and a sulphurisation chamber. A large Geneste-Herscher disinfecting apparatus was to have been installed in the lazaret, but could not be conveyed there on account of its weight.

Maritime health stations have been established at Boké, Forecariah, Beffa and Victoria.

3. *Ivory Coast.*

Health Directorate :	Abidjean.	Head of the Health Service of the Colony.

Public Health area :	Grand-Bassam and Bingerville. Medical Officer in charge of the Grand-Bassam ambulance station—Chief Medical Officer of Health.	There is a lazaret at Grand-Bassam with two Clayton apparatus, type H, mounted on wheels.

There are maritime health stations at Tabu, Grand Lahu, Assinia and Sassandra.

4. *Dahomey*.

Health Directorate :	Porto-Novo.	Head of the Health Service of the Colony.
Public Health area :	Kotonu. Medical Officer in charge of the ambulance station—Chief Medical Officer of Health.	There is a lazaret 10 kilometres from Kotonu equipped with formalisators and a Geneste-Herscher disinfecting apparatus.

5. *Sudan*.

Health Directorate :	Bamako.	Head of Health Service of the Colony.
Public Health area :	Kayes. Medical Officer in charge of the ambulance station—Medical Officer of Health.	Portable equipment. Clayton apparatus, type B, installed on a barge.

E. CAMEROONS.

(Mandated Territory).

(*a*) Geographical Survey.

The territory of the Cameroons reaches like a wedge into the interior of Africa as far as Lake Chad, a distance of more than 1,500 kilometres. It is contiguous in the west to Nigeria, in the east to Ubanghi and Shari and Chad, and in the south to Spanish Guinea, the Middle Congo and Gabon. The length of its coastline is only 200 kilometres.

Its area is about 400,000 square kilometres, and it lies between 2° and 13° N. lat. and 9° 45′ and 16° 15′ E. long.

The coastal zone, which is composed of sand and mud, is followed by a zone of laterite, gradually rising up to a central plateau in which ranges of 1,500 and 1,600 metres altitude are not uncommon and extend northwards as far as the Benue. This plateau is healthy and the scenery beautiful.

There are numerous rivers in the coastal basin. The most important are : the Mungo, navigable as far as Manyabeach (120 kilometres from the mouth) ; the Wuri, navigable to Yabassi (65 kilometres from the mouth) ; the Dibamba ; the Sanaga, navigable to Edea (80 kilometres) ; and the Nyong, navigable to Dehane (60 kilometres). Some of the rivers in the basin of the Congo (the N'Goko), of Lake Chad (the Logone) and of the Niger (Benue) rise in the central plateau.

(*b*) Climate.

There is a dry season, from November to April, and a rainy or winter season, from May to October inclusive. June, July, August and September are the wettest months.

The Cameroons consist of plains, wooded or grassy plateaux and vast forests extending over more than 600 square kilometres ; it will be realised, therefore, that the temperature varies considerably in the different zones.

In the coastal zone the maximum temperatures observed are 30° and the minimum 23°. Europeans find these temperatures trying on account of the excessive moisture of the air.

North of 7° N. lat. the temperature falls. The coldest months are December and January. At Yaunde the temperature in December varies between 20° (minimum) and 24° (maximum).

(*c*) Population.

1. The native population numbers about 3,000,000, and may be divided into ethnical groups as follows :—

Bantus	1,400,000
Black Sudanese . . .	1,500,000
Choas or Chad Arabs .	50,000
Fulas	50,000
Hausas	25,000
Negrillos	20,000

The density of population is a little under eight per kilometre. This is low compared with France, where the density is 75, but it is a fairly high average compared with that for the African Continent as a whole (2) and French Equatorial Africa (1). The density varies in the different

regions. In the forest zone it is a little over 4, but falls below 3 in the Banyo-Tibeti region ; in the upland ranges it is 8, and rises to 11, 18 and 20 in the regions of the Upper Logone and Maiwa.

The Bantus, who are probably a mixture of Negrillos and Sudanese, inhabit the forest zone as far as the outskirts of the higher plateaux (Yaundé-Bakokos, Mabeas, etc.). The Sudanese (a race of mixed Bantu and Negrillo origin) are an agricultural people living on the high ranges of the west and the central plateau.

The Fulas inhabit the Central and Southern Cameroons.

The Choas or Chad Arabs are a cattle-breeding people living in the north of the territory.

The Negrillos are regarded as the aborigines of Africa. They are negroes of small stature, live by hunting, build no villages and do not cultivate the soil.

The Hausas, wandering traders from Sokoto, are to be found in every part of the territory.

(*d*) European Population.

In 1922 there were 741 Europeans in the Cameroons ; of these 159 were officials, 143 were soldiers, 163 traders, 21 settlers, 31 missionaries, 15 miscellaneous, 209 women and children.

The chief towns are : Duala (native population 25,000) situated on a bay which is easy of access and is the railhead of two lines, the Central Railway and the Northern Railway (exports—palm sap, palm-oil, cocoa, timber, etc.) ; Edea, situated 80 kilometres along the Central railway ; Kribi, once the chief port of the colony ; Yaundé, which has been the administrative capital since the Decree of March 23rd, 1921 ; and Garua, on the banks of the Benue which exports wax, ox-hides, karité nuts, gum arabic and ground-nuts.

(*e*) Economic Survey.

The Cameroons are divided into two zones, namely, the forest zone, occupying about 15 million hectares in the southern part of the territory, and another zone, comprising all the rest of the country.

The natural wealth of the forest land is very great. Its products include :—

(1) Palm-oil and palm-kernels. Exports in 1920 : 22,574 tons of almonds, 2,649 tons of oil.

(2) Indiarubber. Exports in 1921 : 704,466 kilos.

(3) Gum copal, the cultivation of which, however, has now been abandoned.

(4) Coconut palms (on the coast). The quantity produced at present, however, is not sufficient to supply the copra trade.

(5) Palm trees, such as the raffia palm and the rattan.

(6) Cocoa plants. Quantity of cocoa exported in 1921 : 3,289,016 kilos.

(7) Timber of various qualities and kinds, such as the njabi.

In the savannah region in the north, karité nuts, cotton etc., are found.

The principal foodstuffs produced are the banana and the macabo, which form the staple food of the natives, manioc, sweet potatoes, yams, maize, gombo, groundnuts, haricot beans, gourds, onions, and pepper.

Rice is now grown in the district of Yaunde and Ebolowa.

(*f*) Budgetary Credits.

The autonomous budget of the Public Health Service is as follows :—

Local Budget	Personnel	Material		Total	Percentage
23,511,000	931,358	1,279,642	including 394,142 for works and transport of various kinds.	2,211,000	9.40

(*g*) General Organisation of the Public Health Service.

The territory of the Cameroons has had an independent Government since the Decree of March 23rd, 1921.

The Public Health and Medical Services are under the direction of a Senior Medical Officer (Second class) of the Colonial Army.

His staff consists of the following (budget establishment) :

Medical Officers of the Colonial Medical Corps, unattached	12
Civil doctors engaged under contract	6
Army Medical Officers who also assist the Medical Relief Service	2
Medical Officer seconded to the railway	1
Pharmaceutical chemist in the Colonial Army . .	1
Total	22

European nurses (male) from the Hospital Assistants' Section of Colonial Troops	5
Nurses (female)	3
Native nurses (male)	100
Total	108

The territory is divided into the following nine areas, which are named after their chief towns, and each of which has a medical officer : Kribi, Edea, Duala, Bana, Yaundé, Garwa-Mora, N'Gaundere, Dumé, and Ebolowa. In each area there is a Public Health Board for the supervision of public hygiene and the protection of public health.

There is also a Supreme Health and Sanitation Board at Duala which considers measures of a general nature applying to the territory as a whole.

(*h*) Health Institutions.

1 hospital at Duala : 40 beds for Europeans, 150 for natives.
1 " " Yaundé : 4 beds for Europeans, 100 for natives.
1 " " Ebolowa : 80 beds for natives.
1 " " Kridi : 15 beds for Europeans, 40 for natives.
1 " " Edea : 40 beds for natives.
1 " " Dumé : 30 beds for natives.
1 " " Garwa : 28 beds for natives.
1 " " Dshang : 20 beds for natives.
3 dispensaries at Duala (1 maternity ward).
1 consultation centre at Deido with maternity ward and 20 hospital beds.
1 " " at Akwa.
1 " " at New Bell.

There are 500 hospital beds in the territory as a whole.

(*i*) Results.

	Years.						
	1917	1918	1919	1920	1921	1922	1923
Consultations	74,502	129,817	111,983	180,689	324,942	404,710	580,638
Persons admitted to Hospital	1,723	2,926	2,243	2,490	3,603	6,209	5,729
Number of days' treatment	47,293	77,720	55,783	62,755	84,941	102,790	96,592
Vaccinations	59,682	22,934	43,200	50,746	213,789	350,282	237,702

The health situation is on the whole satisfactory and this is due to the fact that (1) the inhabitants are well fed (the economic progress of the Cameroons is very satisfactory) and their coefficient of resistance to disease is thereby increased ; (2) they are not obliged to engage in exhausting manual labour.

Accordingly, the death-rate is lower than in the other regions of Tropical Africa.

(*j*) Principal Endemic Diseases.

1. *Sleeping-Sickness.*

There is a focus of trypanosomiasis in the district of the Upper Nyong and the valley of Dumé. A prophylactic sector has been organised there on the usual lines, having a centre for study and instruction, provided with a laboratory at Ayos.

Details regarding the incidence, mortality and treatment of the disease will be found in an article published in the *Bulletin de l'Office international d'Hygiène publique* for May 1925.

A mission sent to the north of the Cameroons found on the Lagone a large focus of trypanosomiasis, which had already been noted by Dr. Jamot. Steps were taken, by arrangement with the Health Service of French Equatorial Africa, to organise in this region a new prophylactic sector which will extend to the right bank of the Lower Shari, the two regions of the Middle Shari and the right bank of the Lower Logone. Two medical inspection stations have already been established, at Lai and Fort-Archambault, for the purpose of stopping persons found to be infected.

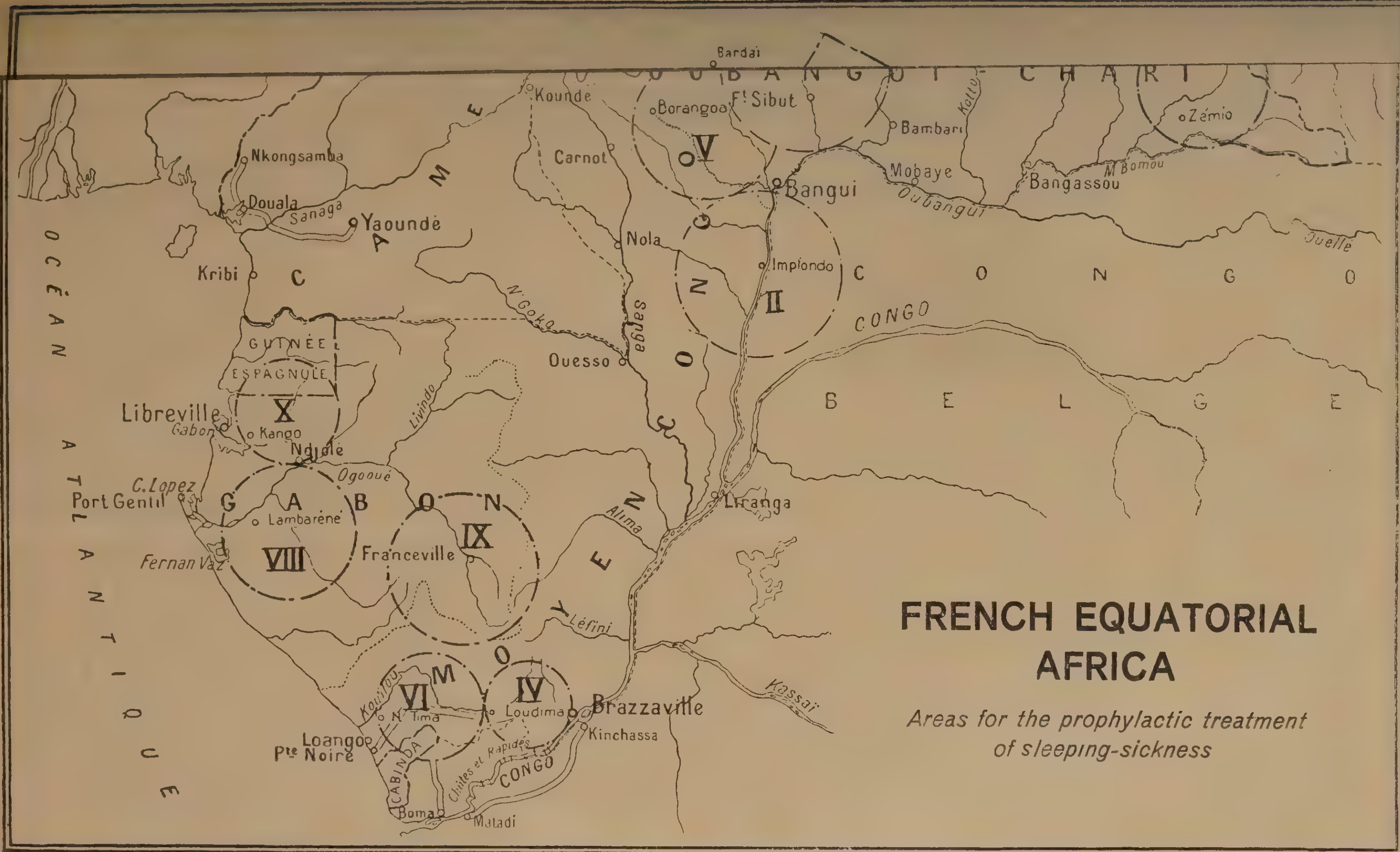
2. *Smallpox.*

Smallpox has only been found in small isolated foci in the regions of Dshang, Duala, Edea and on the bank of the Nyong. 222,400 doses of fresh vaccine obtained from the Vaccination Institute at Duala and 16,000 doses of dried vaccine have been sent to the various stations. A credit of 32,000 francs was appropriated in 1924 for the establishment of a new vaccination institute at Duala.

3. *Leprosy.*

There are at present 1,483 recognised and segregated *lepers* in the territory. The employment of the new treatment of leprosy by means of Chaulmoogra ethers will no doubt lead to increased attendance at the dispensaries and the discovery of cases will thus be greatly facilitated. Nevertheless, improvement in therapeutic methods is slow, and accordingly the prophylactic measures which seem most suitable are still applied, viz :

(1) Lepers without open lesions are treated at dispensaries ;


FRENCH EQUATORIAL AFRICA
Areas for the prophylactic treatment of sleeping-sickness
OUBANGUI - CHARI
CAMEROUN
MOYEN CONGO
GABON
CONGO BELGE
OCÉAN ATLANTIQUE
GUINÉE ESPAGNOLE
CABINDA
Bardaï
Kounde
Borangoa
Ft Sibut
Bambari
Zémio
Kotto
Carnot
Nkongsamba
Douala
Sanaga
Yaoundé
Kribi
Nola
Bangui
Mobaye
Bangassou
M'Bomou
Oubangui
Ouellé
Impfondo
N'Goko
Sanga
Ouesso
CONGO
Libreville
Gabon
Kango
Ndjolé
Livindo
Ogooué
C. Lopez
Port Gentil
Lambaréné
Fernan Vaz
Franceville
Alima
Liranga
Léfini
Kassaï
Brazzaville
Kinchassa
Loudima
N'Tima
Kouilou
Loango
Pte Noire
Chutes et Rapides
Boma
Matadi
I
II
IV
V
VI
VIII
IX
X

FRENCH EQUATORIAL AFRICA

Areas for the prophylactic treatment of sleeping-sickness

(2) Lepers with open lesions are isolated in hospital as infection carriers ;

(3) Lepers who are in an advanced stage of the disease, or crippled or bedridden, are placed in a home, or, if still fit for manual labour, in an agricultural colony.

4. *Malaria.*

Malaria is commonest among infants and young children. Out of a total of more than 100,000 patients who came to the dispensaries for consultations, 2,259 (of whom 1,735 were children) were suffering from malaria. 195 kgs. of quinine and 1,800 phials of alkaloid were dispensed in the territory.

5. *Syphilis.*

8,237 cases of syphilis were treated at the various dispensaries, the number of consultations being 23,718. The principal reason why so many persons have presented themselves for treatment is the rapid action of arseno-benzol on specific lesions which cannot fail to strike the patients. Consultation rooms for pregnant women suffering from syphilis have been opened at Ebolowa and Yaundé. In 1923 29,050 doses of novarsenobenzol were distributed and 3.7 kgs. of salts of mercury, 345 kgs. of potassium iodide and 2,830 phials of bismuth salts (Muthranol).

6. *Yaws.*

There were 6,552 cases of yaws, chiefly in the centres of Yaundé and Duala ; most of the patients were children. Stovarsol tablets have been distributed on a large scale and have proved most effective.

(*k*) Maritime Health Police.

There is a Public Health Board at Duala.

At the port there is a Medical Inspector of Shipping and sworn subordinate officials ; the port also possesses a Clayton apparatus and a Geneste-Herscher steam-bath.

The question of a lazaret is under consideration.

F. FRENCH EQUATORIAL AFRICA.

(*a*) Geographical Survey.

French Equatorial Africa is a vast territory of 2,500,000 square kilometres—about $4\,^1/_2$ times the size of France—the main axis of which extends from 5° S. lat. to 20° N., on the borders of the Tibesti and Italian Libya. It is bounded on the west by British Nigeria, on the east by Portuguese

Cabinda, the Belgian Congo and the Anglo-Egyptian Sudan. It consists of four administrative subdivisions :— Gabon (capital Libreville), the Middle Congo (capital Brazzaville, the residence of the Governor-General), Ubangi-Shari (capital Bangui), and Chad (capital Fort-Lamy).

The colony is more or less divided into five zones, which differ from each other both as regards physical structure and economic conditions and ethnography. The country rises in successive terraces to the watershed of the Congo Basin, at an altitude of 300 metres. There is a low coastal belt, a belt of virgin forest, then a succession of grassy plateaux and the sandy steppes of the upper plateaux.

Apart from the Gabon littoral (200 kilometres in length) and the Chad basin, French Equatorial Africa as a whole has an altitude of over 300 metres. There are peaks over 1,000 metres high in the Monts de Cristal and the ranges south of Ogowé. In the Tibesti, too, there are very high peaks, some of which, such as Tussiolé, Uzom and Tiezzoko, are over 3,000 metres high. It would seem, therefore, that suitable sites for sanatoria could be found in these regions.

The river system of French Equatorial Africa is very extensive, and may play the principal rôle in changing agricultural conditions there. The chief rivers are : in Gabon, the Ogowé (1,200 kilometres), navigable from Port-Gentil to Alembé 310 kilometres) ; in the Middle Congo, the Niari-Kuilu, 640 kilometres in length, the basin of which has an area of 60,900 square kilometres. From its confluence with the Ubangi to Mayaniga (687 kilometres) it forms the boundary between the Belgian Congo and the Middle Congo. Its principal tributaries are the Ubangi, the Ibenga, the Motaba, the Sanga, the Lobay, the Kwango, the Kotto, the Mbari, etc.

North and west of Ubangi-Shari the rivers flow into Lake Chad through the Logone and the Shari, which is formed by the confluence of a number of large tributaries, such as the Bahr-Sara (830 kilometres), the Gribingui (410 kilometres), the Aouk (700 kilometres), etc.

During the rainy season (July-December) the Ubangi is navigable up to Bangui by Congo steamers 30 metres in length and drawing one metre, and from Bangui to Mobaye by small steamers drawing 0.70 metre.

(*b*) Climate.

The climate varies in the different zones. It is of the Sahara type between the Tropic of Cancer and 16° N. lat. and tropical between 16° and 5° N. lat., while the rest of the country lies in the equatorial belt.

The differences between the daily maximum and minimum temperatures, and the mean annual rainfall, vary according to the distance from the Sahara region. Thus :

At Libreville,	the max. is 33.6° ;	min. 19.6° ;	difference 14°.
At Bangui	" 41° ;	" 16° ;	" 25°.
At Fort Archambault	" 41.3° ;	" 13° ;	" 28.1°.
At Fort Lamy	" 49° ;	" 8.5° ;	" 40.5°.
At Bir-Ali	49.3° ;	" 5° ;	" 44.3°.

The mean annual rainfall at Libreville is 2,586 mm., whereas at Fort Lamy it is only 730 mm.

As in all tropical climates, there are only two regularly recurring seasons, the dry and the wet, the latter being longer the nearer the country is to the equatorial cloud-ring.

(*c*) Population.

According to the recent demographic statistics—which may, however, require revision—the population numbers 2,821,981, of which 2,932 are Europeans. It is distributed as follows :

Gabon	388,778
Middle Congo	581,343
Ubangi-Shari	606,644
Chad	1,245,416

The density of population is thus a little under one inhabitant per square kilometre.

The various races may be classified as follows :—

(1) Pahnin invaders from the west ;

(2) Aborigines ;

(3) The Moslem populations in the north, who may be subdivided into sedentary, semi-sedentary and nomad peoples.

The aborigines include the Gabonese (fetish-worshippers), the Bateké of the Middle Congo (a superior and intelligent race), the Bakugo, who are found between the Alima and the Kuilu (cannibal fetish-worshippers), and the peoples of the Upper Ubangi and the Upper Shari (Mandja, Sara, Banola, Niam-Niam, also fetish-worshippers).

(*d*) Economic Survey.

The principal natural wealth of French Equatorial Africa consists in the great equatorial forests which extend from the ocean over the whole of central Africa, and have a total area estimated at 40,000,000 hectares. The virgin forest is similar to that of other countries in the same latitudes,—great trees, 30 to 60 metres high, bound together by giant creepers ; underneath this canopy, stunted trees and palms, and shrubs and brushwood

a few metres high, inextricably entangled with herbaceous lianas. The rays of the sun never penetrate this triple screen of foliage.

Timber of the species found in the forests of Gabon may be used in place of the kinds ordinarily used for joinery, cabinet-work, carpentry, carriage-building, etc. (poplar, pine, beech, oak, teak, hornbeam, elm, mahogany, ebony, etc.). In 1922, the Congo exported 102,000 tons of timber.

Among other agricultural products, mention may be made of india-rubber (*funtumia elastica*), the karité tree, which is found in the savannah region and provides a very nourishing kind of butter, cotton, the silk-cotton tree, which yields a kind of down called " kapok ", oil palms, which are widely used for food by the natives, coffee, and the agave, which as a textile is comparable with the Mexican agave.

The sub-soil contains a large variety of mineral substances—iron, coal, viscous hydro-carbons, graphite, tin, manganese, limestones, yielding very rich lime and, above all, extensive deposits of copper alloyed with other metals (iron, lead, silver, zinc, manganese), found wherever folded Devonian limestone is covered with a stratum of sandstone [1].

(*e*) Health Policy.

The health policy adopted in these regions has already been described in connection with the treatment of sleeping-sickness and the organisation of prophylactic sectors. The essential requirements are that the Atoxylisation Service should be mobile, and that the doctors should be able to cover wide areas, collect statistics regarding the native populations, diagnose cases, isolate patients and sterilise virus centres. This *mobile* prophylactic service calls for the utmost zeal and devotion on the part of those engaged in it.

(*f*) General Organisation of the Public Health Service.

At the head of the Health Service of this group of colonies there is, attached to the Governor-General, a Medical Inspector of the Colonial Medical Corps. In each separate colony, a chief of the Public Health Service (a senior medical officer, first class, or a principal medical officer, second class) is responsible for the public health services of that colony under the supreme authority of the Medical Inspector.

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[1] Fuller details on this and the previous questions will be found in Paulin : " *L'Afrique équatoriale française, 1924* ".

(g) Budgetary Credits (1924).

Colony	Total local Budget	Portion appropriated for Public Health and Medical Services. Personel	Material	Total	Percentage
General Budget for French Equatorial Africa	14,720,000	5,100	500	5,600	0.038
Gabon	3,800,000	292,187	174,880	467,067	12.29
Middle Congo	4,460,000	337,065	155,750	492,815	11.04
Ubangi-Shari	4,020,000	176,970	81,613	258,583	6.43
Chad	4,050,000	195,000	83,500	278,500	6.87
State Subsidy for combating trypanosomiasis	1,000,000	623,000	337,000	1,000,000	100
Total	32,050,000	1,629,322	833,243	2,502,565	8.38

(h) Health Personnel.

1. *Europeans.*

Civilian doctors		—
Medical officers, Colonial Service :	military	4
	General Service	11
	unattached	28
	Total	43
Pharmaceutical chemists :	Civilian	—
	Colonial Service	1
	Total	1
Nurses (male) :	Civilian	—
	Colonial Service	8
	Total	8
Nurses (female) :	Civilian	—
	Colonial Service	2
	Total	2
Midwives :	Civilian	—
	Colonial Service	—

2. *Natives.*

Assistant doctors		—
Midwives		—
Nurses (male) :	Civilian	146
	Colonial Service	18
Atoxylisers (staff for the administration of atoxyl injections)		81

(i) Health Institutions.

Middle Congo : 1 general service hospital at Brazzaville,
1 native hospital at Brazzaville,
2 sleeping-sickness stations at Brazzaville and Impfondo,
4 medical stations and dispensaries.

Gabon : 1 local service ambulance for the use of Europeans at Libreville,
1 native hospital at Libreville,
1 sleeping-sickness station,
4 ambulances at Fort-Gentil, Lambaréné, Oyem and Djolé,
1 medical station at Makok.

Ubangi-Shari : 1 local service ambulance station for the use of Europeans at Banghi,
1 native hospital at Banghi,
3 sleeping-sickness stations, at Banghi, Dakoa and Fort-Sibut.

Chad : 1 local service ambulance station for the use of Europeans at Fort-Lamy,
1 native hospital at Fort-Lamy,
1 sleeping-sickness station,
4 medical stations.

There is also a prophylactic service against sleeping-sickness, divided into 12 sectors, as follows :

5 sectors in the Middle Congo,
3 " in Gabon,
3 " in Ubangi-Shari,
1 " in Chad.

(j) Scientific Institutes.

A Pasteur Institute at Brazzaville (Middle Congo),
A chemical laboratory at Brazzaville (Middle Congo),
A bacteriological laboratory at Libreville (Gabon).

(k) Statistics of Cases treated in 1923.

(a) Sleeping-sickness service :

Number of cases of trypanosomiasis under observation	275,000
Number of cases of trypanosomiasis under treatment . .	80,000
Percentage of deaths	15 %

(b) Other diseases :

Number of cases treated in hospitals	3,000
Number of consultations for diseases other than trypanosomiasis	240.000
Number of vaccinations against smallpox	100,000

(l) Survey of Health Conditions in 1923.

Principal endemic diseases : Sleeping-sickness, malaria, bacillary dysentry and smallpox.

Sleeping sickness and *malaria* are found chiefly in the Middle Congo, Gabon and Ubangi-Shari.

Bacillary dysentery was the cause of 2,126 deaths in the Middle Congo and 48 deaths in Gabon during the period August 1922-May 1923.

Smallpox has been observed throughout French Equatorial Africa.

The incidence of smallpox was as follows :—

Middle Congo : 31 cases, 4 deaths.
Gabon : a few cases, 4 deaths.
Ubangi-Shari : 638 deaths.
Chad : 106 cases, 17 deaths.

(m) Maritime Health Police.

The only colony in which the Maritime Health Authorities have to take measures to prevent the introduction of disease from abroad is Gabon, since access to French Equatorial Africa from the sea is only possible at this point.

The Middle Congo is protected by the Belgian Congo, which has to be crossed before Brazzaville can be reached by the Matadi sea-route (health station at Banana).

Accordingly there is no maritime health police service except at Libreville and Port-Gentil and the service established at Pointe-Noire since work was begun on the railway from Brazzaville to the sea.

Libreville possesses a lazaret, and suspected vessels are sent to that port from Port-Gentil and Pointe-Noire.

(n) Work of Prophylactic Sectors in 1924 [1].

Sector I. Upper Shari, centre : Dekoa.

Number of natives examined	81,984
Existing cases of trypanosomiasis	1,666
New " " "	2,012
Index	4.48 %
Deaths	1,215

Sector II. Ibenga-Motaba, centre : Impfondo.

Number of natives examined	21,462
Existing cases of trypanosomiasis	2,420
New " " "	229
Index	12.3 %
Deaths	249

[1] From a report from Dr. Blanchard, Director of the Brazzaville Pasteur Institute.

Sector III. Chad, centre : Fort-Archambault.

Number of natives examined	414,865
Existing cases of trypanosomiasis	11,918
New " " "	1,655
Deaths	1,172

Sector IV. Djoué-Ludima, centre : Ludima.

Has only been partially in operation, with a staff of native nurses.

Sector V. Lobaye-Wam-Fafa, centre : Bossangoa.

Number of natives examined	5,980
Existing cases of trypanosomiasis	63
New " " "	53
Deaths	56

Sector VI. Loango-Ludima, centre : N'Tima.

Number of natives examined	50,700
Existing cases of trypanosomiasis	1,851
New " " "	1,384
Deaths	315

Sector VII. Upper M'Bomu, centre : Zemio.

(No figures available).

Sector VIII. Lower Ogowé-Bongo, centre : Lambaréné

(Not in operation).

Sector IX. Upper Ogowé, centre : Franceville.

Number of natives examined	7,009
Existing cases of trypanosomiasis	129
New " " "	2,622
Index	39.24 %

Sector X. Gabon-Como estuary, centre : Kango.

Number of natives examined	18,464
Existing cases of trypanosomiasis	615
New " " "	146
Deaths known	66

Sector of the Lower Shari, centre : Fort-Lamy.

(Established by Decree of July 18th, 1924)

Number of natives examined	6,417
Recognised cases of trypanosomiasis	196

(o) Medical Treatment of Trypanosomiasis.

Trypanosoma, like all protozoa, react to chemical medicaments and, indeed, as Fourneau [1] states, it may be said that " chemiotherapy had its source in the wider knowledge of trypanosomiasis ". The medicines which have been tried include, in particular, colouring-matters derived from benzidine (Erlich and Shiga's *Trypanrot* and Mesnil and Nicolle's *Afridol)*, antimony salts and arsenic compounds. It is the latter which have received chief attention from the outset, and more particularly atoxyl (a sodium salt of p. aminophenyl-arsenic acid), which the prophylactic sectors now definitely prefer. Its posology has been exactly determined by Ouzilleau and Lefrou [2]. In the first stage of the disease, strong doses of 0.015 to 0.02 gramme per kilo should be given in the form of a single series of six injections, with an interval of 14 days between each injection. In the second stage, however, strong doses of atoxyl should be avoided, as they may have serious consequences, such as amaurosis. Indeed this treatment is only effective at the first stage, when the trypanosoma are still localised in the blood or the lymphatic ganglions. It is as a rule unsuccessful once the parasites have invaded the cerebro-spinal system and entered the cephalorrhachidian fluid. Sleeping-sickness is somewhat akin to syphilis in this respect, that it is difficult to cure once it has attacked the nervous system.

Since the end of 1920 a great deal has been heard of a new trypanocide medicine called " 205 Bayer ". The makers, who are German, have not yet revealed the composition of this substance. According to Fourneau's investigations [3], however, it is simply urea of meta-aminobenzoyl-paramethyl meta-aminobenzoyl-I-aminonaphtalene-trisulfonate of sodium 4-6-8, which he has termed "309". Good results have been obtained by the German doctors Kleine and Fischer and the Belgian doctor Van den Branden, who have experimented with it in the Congo. Its trypanocide action is certain, and it is claimed that the typical cure of Bayer 205 has the advantage of requiring four injections only, whereas the atoxyl cure is much slower. Nevertheless, other observers, Drs. Walravens and Van Hoof in the Congo and Tanon and Jamot in the Cameroons, say that the results obtained with Bayer 205 are no better than those obtained with atoxyl and that it has the serious disadvantage of causing the lesions associated with chronic nephritis.

Dr. Louise Pearce, of the Rockefeller Institute for Medical Research in New York, has been kind enough to place at the Department's disposal a

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[1] *Paris Médical*, December 22nd, 1923 : " Chimiothérapie des trypanosomes ".
[2] *Annales Institut Pasteur*, March 1923.
[3] *Annales Institut Pasteur*, February 1924.

new medicine called " tryparsamide ", which is to be tried in the prophylactic sectors of the Cameroons and French Equatorial Africa.

This product is a sodium salt of the N-phenyl-glycine-amide-p-arsenic acid, which possesses very marked spirocheticide properties, and has already been successfully employed for neuro-syphilis.

Drs. Jamot, Letonturier and de Marqueissac, who have experimented with this medicine at Ayos, declare themselves satisfied with the results obtained in cases of nervous forms of trypanosomiasis and consider that no other trypanocide substance has so great a power of meningeal penetration.

Drs. Blanchard and Laigret, of the Brazzaville Pasteur Institute, also express a favourable opinion, though their approval is more qualified. Their conclusions may be summarised as follows :

The sterilising action of tryparsamide on the trypanosoma of the peripheric circulation is as sure and as rapid as that of atoxyl, *but it cannot be used hypodermically.*

Its action on the second stage of sleeping-sickness is more effective than that of atoxyl ; there is a more marked decrease of lymphocytosis, a decrease of albuminosis, a more rapid and marked action on the clinical symptoms of trypanosomiasis ; *on the other hand, it is necessary to give strong and repeated doses,* which render the practical application of the treatment difficult.

Van den Branden also conducted experiments in the Belgian Congo with chronic trypanosomiasis cases and obtained good results.

> Among patients whose cerebro-spinal fluid revealed a lymphocytosis of 50 lymphocytes per cubic millimetre he obtained cures in 50 per cent of the cases with 20 to 62 grammes of tryparsamide ;
>
> Among patients with a lymphocytosis of 50 to 100, 22 per cent died, and 33 per cent were cured, with doses of 17 to 60 gr. ;
>
> Among patients with a lymphocytosis of 100 to 200, 25 per cent were cured with doses varying from between 20 and 70 gr.;
>
> Among patients with a lymphocytosis of 200 to 500, 6.3 per cent died, while 12.5 per cent were cured, with doses of tryparsamide varying between 15 and 70 gr.;
>
> Among patients with a lymphocytosis of 500, 25 per cent were cured with doses of from 19 to 74 gr.;
>
> Lastly, among patients whose cerebro-spinal fluid revealed the presence of trypanosomes, he noted that 17.6 per cent died, and 17.6 per cent were cured, with doses varying between 19 and 60 gr.

A more recent note by Laigret throws further light on the question. At the Pasteur Institute at Brazzaville, 95 cases of sleeping-sickness patients were treated with tryparsamide and observed for a period of from eight to

twelve months [1]. The conclusions of this interesting work are so important that we believe they will entirely revolutionise the treatment and therapeutic prophylaxis of sleeping-sickness.

As far back as June 11th, 1924, the Trypanosomiasis Commission of the Société de Pathologie exotique noted the inadequacy of so-called " minimum " atoxylisation (two injections) for sterilising germ-carriers and recommended " the use of atoxyl in strong doses of 1.5 to 2 cgr. per kilo administered in an annual series of six injections separated by intervals of ten days. This type of treatment lasts 50 days ; at present it is the best method, since only about 6 per cent of the patients relapse in the twelfth month ".

Laigret's deductions are even more conclusive. All the patients he observed were in the second stage of trypanosomiasis.

In the case of those in the *advanced secondary stage* with profound modifications of the cerebro-spinal fluid and serious clinical symptoms (drowsiness, paralysis, trembling, mental disorders, etc.), tryparsamide led to the disappearance of the trypanosomes in the cerebro-spinal fluid, the reversion of the albumino-cytological formula to the normal, and such rapid clinical improvements that the natives believed them to be miraculous, as in therapeutic treatment of yaws and syphilis with the arsenobenzols.

Accidents noted out of 20 cases : one slight amaurosis and one death due no doubt to the administration of too strong a dose.

In the *final stage*, among impotent, cachectic and imbecile persons practically on the point of death, Laigret secured, in 13 cases out of 18, survivals lasting from eight months to one year. The mortality among bedridden patients isolated in the Brazzaville quarantine station, which varied between 4 and 12 per cent before the introduction of tryparsamide, rapidly fell to 3 per cent, 2 per cent and even zero in certain months.

On the basis of his own observations and those of Van den Branden, who remarks that, out of 100 patients treated in the first stage, sterilisation in each case was still complete after one year of observation, Laigret considers that it is most desirable to substitute tryparsamide for atoxyl in current prophylactic practice. This opinion is shared by Dr. Jamot, who informed us personally that he had obtained literal resurrections in apparently hopeless cases.

The next passage is best given in Dr. Laigret's own words :—

> " The superiority of tryparsamide consists in the fact that, unlike atoxyl, it does not confine its sterilising action to the trypanosomes of

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[1] " Note on the Treatment of Human Trypanosomiasis with Tryparsamide, and the Use of this Product in Prophylactic Practice ", *Bulletin de la Société de Pathologie exotique*, December 9th, 1925.

the blood and ganglia, but extends it to those of the central nervous system. In current practice, however, among the sleeping-sickness cases which can be traced, a large proportion already have trypanosomes in their nerve-centres (*half or two-thirds of the cases, according to the district*) ; these patients, who are incurable or not sterilisable by atoxyl, propagate the endemic if they are left in their villages ; while to isolate them all in camps would be difficult. On the other hand, with tryparsamide, durable sterilisation can be produced. This gives quite a new aspect to the future of the campaign against sleeping-sickness. "

The cure consists of six weekly injections in increasing doses of four cgr. per kilo (two injections), five cgr. (two injections), six cgr. (two injections), making a total of fifteen grammes for an adult of 50 kilos.

The endo-venous method need no longer be regarded as an obstacle, for it is currently used in Tropical Africa. The price of the medicament is high, for each cure costs on an average thirty francs. But on the whole, it is less expensive than the treatment of a syphilis case and ample compensation will be provided in the future by the preservation of valuable labour reserves which are threatened by a fatal endemic disease.

The Belgians manufacture a similar product which is cheaper than the American product, and Laigret, in collaboration with Mme. de Trevise, has sent to the Pasteur Institute of Brazzaville for experiment medicaments 270 and 273 which appear to possess properties similar to those of tryparsamide.

In these circumstances, we seem to be justified in concluding that the principal prophylactic measures against trypanosomiasis should, in future, be the following :—

(1) Replace atoxylisation by tryparsamidation ;

(2) Pursue the complete sterilisation of germ-carriers in a particular sector until none are left ;

(3) Improve the sanitary conditions of each village by clearing away the undergrowth and moving the sites of badly situated villages, so as to prevent the re-infection of cured patients by fresh bites from infecting " glossinæ " ;

(4) Make suspected or contaminated natives carry health passports in order to prevent the spread of the virus.

There can be no doubt that the development of the rail-and-road system in the various districts will exercise a most favourable influence by creating trading centres that will tend to check the nomadic habits of the native population.

As in the case of malaria, the chief prophylactic measure in sleeping-

sickness must be the sterilisation of the sources of virus. But whereas, in the former malady, the parasite cannot be reached by quinine in the recesses of the organs, the power of penetration of tryparsamide already observed in the case of syphilis [1] renders it possible to destroy the flagellates which are soaking into the cerebro-spinal fluid and have already invaded the central nervous system.

G. TOGOLAND.

(Mandated Territory.)

(*a*) Geographical Survey.

As regards general configuration, Togoland is a rectangular strip of territory bounded by the Gold Coast in the west, the Upper Volta in the north and Dahomey in the east, the territory measuring about 550 kilometres in length. It opens on to the Gulf of Benin, the coast-line being 50 kilometres in length ; the area is 70,000 square kilometres.

Togoland is divided by a mountain-chain running from S.S.W. to N.N.E., which is crossed by the Volta and the Kerang. It includes : (1) a sandy coastal zone ; (2) a coastal plateau of 70-100 metres altitude ; (3) the Togoland mountains 500-1,000 metres high, the principal peaks of which are Mounts Agu, the Fetishes (the home of gods and fetishes, an almost inaccessible mountain range), Kara, Chandeo and Barba-Bassari ; (4) lastly, west of the Togoland mountains, a large plain watered by the Volta, the Oti, and all their tributaries.

On each side of the mountains there are watercourses flowing south, namely : (1) the Volta system (now in the British zone) and its tributaries, the chief being the Oti, into which flow the Kummaga or Kerang, the Kara and the Mo ; (2) the coastal rivers, the Sio and the Haho, which flow into Lake Togo after forming a delta, and the Mono, the lower reaches of which follow the Dahomey frontier line.

(*b*) Climate.

As regards climate, Togoland is divided into three zones :—

(1) The coastal zone, with a small rainfall 500 to 700 mm. per annum, but damp even during the dry season (December to March) when the Harmattan or north wind blows—the climate is trying in March and April (the beginning of the rainy season), but is tempered by sea-breezes.

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[1] See L. Cheinisse : " Tryparsamide in the Treatment of Neuro-syphilis ", *Presse médicale*, November 8th, 1924.

(2) The central zone, which extends from the neighbourhood of Atakpamé to Sokodé, characterised by very heavy rainfall during the rainy season (1,260 to 1,500 millimetres per annum), whereas the dry season is only interrupted by very occasional tornadoes (December and January). This region is a healthy one for Europeans, the nights being fairly cool, except in March and April. In the western part of this zone is the Palimé Basin, which is very wet (the rainfall being 1,500 to 2,000 millimetres per annum) and particularly trying for Europeans ; the heights which surround it, however, include Mount Kluto, which is well known for its temperate climate and has the characteristic features of a hill-station (800 metres).

(3) Beyond Sokodé there is the Sudanese zone (1,000 to 1,250 millimetres of rain per year), with a rainy season from June to October and a dry season from November to May. April and May are the most trying months, on account of the heat and the violent tornadoes.

(*c*) Population.

In the southern zone are found Ehués, Ashantis, Guangs and the Ngbandjes, who are in constant contact with Europeans and have gradually adapted themselves to their way of living.

In the central zone are the tribes of the Akposso and the Akebu, whose manner of life is organised on special lines and whose religion possesses a mythology.

The northern zone is inhabited by very primitive tribes, whose clothing is of the scantiest. In the east there are the Kotokoli, Losso, Cabrais and Difalé groups of the Bariba race, speaking the Tim language. In the west there are the Moba group (who speak Tim), the Gurmas, the Nagombas, the Nanombas, and the Baulés of the Dagbanne-Mossi race.

Fulas and Haussas are found in Togoland, as indeed throughout the whole of Africa.

The finest racial type in Togoland is the Cabrais, who is vigorous and well proportioned [1].

(*d*) Administrative Divisions.

The territory is divided into six administrative subdivisions or districts (*cercles*), namely : the Lomé district (population 127,000), the capital of which is Lomé and the geographical and commercial centre Tsévié ; the district of Anecho (population 96,000); the district of Kluto (population

[1] The population (758,000) includes 34,000 Christians and 20,000 Moslems. The rest are fetish worshippers.

67,000), with an administrative residence on Mount Kluto and including the trading centre of Palimé, 119 kilometres from Lomé, the railway terminus ; the district of Atakpamé (native population 71,000), with the agricultural station of Nuatja ; the district of Sokodé (native population 293,000), the principal town of which is Bassari (population 9,000) ; the district of Sansanné-Mango (population 135,000), the former capital of Borgou.

(*e*) Economic Survey.

Togoland is essentially an agricultural country.

The maritime zone, which is sandy or alluvial, produces coconuts, cotton, maize, ground-nuts, manioc and palm oil.

The same products can be grown in the central zone, except the coconut and ground-nut.

The zone of the Middle and Lower Mono is suitable for plants requiring richer soil, such as the coffee tree, tobacco plant and sugar-cane.

The zone of the Togoland mountains is the best on account of its moisture and its river system. In this zone are found timber equal to teak, coffee trees, oil-bearing palms, sisal, sugar-cane and foodstuffs of all kinds (manioc, yams, maize, potatoes, " tarots "), and, above all, cocoa-trees.

The flora of the Sudanese zone is mainly scrub, often thorny, various grasses and a few trees such as the *Karité*. The country is rich in live-stock.

The following are a few figures regarding the principle exports :

	1922	1923
Palm kernels . . .	6,168,660 kg.	10,320,786 kg.
Palm oil	950,719 "	2,913,706 "
Cocoa	—	3,324,502 "
Cotton	678 tons	766 tons
Copra (Coconuts) . .	740 "	1,123 "

Food plants are abundantly cultivated in Togoland, and vegetables may be successfully grown in most districts.

The subsoil of Togoland has never been systematically investigated. Veins of gold-bearing quartz have been found, and also beds of chromate of iron [1].

In this territory, which is under French mandate, the Public Health Service is very well organised.

[1] See " Guide to the Colony of Togoland ", Emile Larose, publisher and book-seller, 1924.

(*f*) General Organisation of the Public Health Service.

The Order of August 11th, 1921, lays down regulations regarding medical relief for the natives, the Maritime Health Police and Public Health and Sanitation.

The Public Health Service is directed by a Senior Medical Officer, first Class, of Colonial Troops, who is under the direct authority of the Commissioner of the French Republic, and resides at Lomé.

At Lomé there is a Supreme Public Health and Sanitation Board, and at the headquarters of each of the six administrative districts there is a Public Health Board and a Public Health Service under the supervision of a medical officer.

The registration of births and deaths was made compulsory in urban centres by the Order of November 17th, 1921, and will gradually be extended.

An Order was issued on August 22nd, 1922, promulgating the Decree of July 26th, 1922, regarding the protection of public health and the Decree of June 7th, 1922, providing Regulations for the Maritime Health Police in the Colonies.

An Order was issued on May 26th, 1923, promulgating the Decree of April 20th, 1923, on the importation and sale of chemicals and special pharmaceutical products.

Other Orders have been issued organising ; a mobile medical service (November 27th, 1923); assistance for native mothers and infants (maternity organisation attached to the French Red Cross) (May 22nd, 1924); protection of native labour (October 27th, 1924).

(*g*) Budgetary Credits.

Appropriations for Public Health and Medical Services :

Local Budget	Staff	Material	Total	Percentage
8,206,000	420,089	495,546	915,635	11.15

(*h*) Health Personnel.

1. *European.*

Colonial Medical Officers (unattached)	5
Colonial Government chemists	1

2. *Native.*

Assistant doctors and medical assistants	11
Midwives	2
Male nurses	32
Sanitary Police	17
Total	68

(*i*) Public Health Institutions.

Native hospital	Lomé
Maternity hospital	"
Central dispensary	"
Native hospital	Anecho
Central dispensary	"
Native hospital	Palimé
Central dispensary	"
Native hospital	Atakpamé
Central dispensary	"
Eight branch dispensaries	"

(*j*) Hospital Statistics.

Number of days spent by patients in hospital in 1924 .	754
Number of consultations	216,000
Number of vaccinations	94,673

(*k*) Scientific Institutes.

There is a laboratory for hygiene and microbiology at Lomé.

Epidemic Diseases : There were none with the exception of a few cases of influenza in the districts of Palimé and Lomé, and a few cases of chickenpox.

(*l*) Endemic or Social Diseases.

1. *Malaria* is fairly common, particularly on the borders of the Anecho lagoons, Lake Togo and the Rivers Sio and Haho, but as a rule the outbreaks are not serious. A plentiful supply of quinine is distributed among the inhabitants of marshy areas, particularly children from one to ten years of age.

2. *Amœbic Dysentery :* very rare.

3. *Leprosy :* The number of lepers is estimated at more than 3,000. Treatment by Chaulmoogra ethers has given quite promising results. Lepers who are crippled or have open sores are treated at the Kainkowé leper-hospital, near Lomé, which is under the supervision of a bacteriological specialist.

4. *Trypanosomiasis :* Only a few cases occurred, in a very small area of the district of Klouto-Palimé, near the Gold Coast.

5. *Yaws (Frambesia):* Very common. About three cases per 100 inhabitants.

6. *Tuberculosis :* Very rare.

7. *Venereal Diseases:* Very common in Lower Togoland and also in the villages of the interior situated on the main roads along which the Moslem Haussas travel. In the town of Palimé almost all the women are infected with blennorrhagia or its complications. Syphilis and blennorrhagia are the chief causes of still-births and infant mortality.

(*m*) Maritime Health Police.

The authority in maritime health questions is the Chief of the Health Service, who resides at Lomé and has under his orders two Public Health Officers (*agents ordinaires*) at Lomé and Anecho, and seven sworn subordinate officers (six at Lomé and one at Anecho).

The Colony possesses a native lazaret at Lomé, a Clayton apparatus and a sulphurisation chamber installed near the wharf, and a portable Geneste-Herscher apparatus for the disinfection of personal effects and goods.

In 1924, 314 vessels were inspected, 298 at Lomé and 16 at Anecho.

H. ISLANDS OF ST. PIERRE AND MIQUELON.

(*a*) Geographical Survey.

The Islands of St. Pierre and Miquelon are situated in the Atlantic Ocean at a distance of approximately 3,700 kilometres from the port of Brest ; they consist of several islets lying 40° 46′ lat. north, and 58° 30′ long. west of the Paris meridian. The islands of this group are St. Pierre, Grande and Petite Miquelon or Langlade, the Ile-aux-Chiens, the Grand Colombier and the Petit Colombier, the Ile-aux-Vainqueurs, the Ile-Massacre and the Ile-aux-Moules.

The Island of St. Pierre is 7 1/2 kilometres long and measures 5 1/2 kilometres at the widest point ; its area is 2,600 hectares. It is hilly, but even at the highest point the altitude does not exceed 204 metres. Rocks, shrubs and turf are in possession of this ungrateful soil, on which grow here and there stunted firs and dwarf birches forming dense thickets. These small green bushes and trees, the largest of which are not more than two metres high, form so close-knit an undergrowth as to be almost impenetrable.

On St. Pierre there are no rivers, but a number of streams which form an outlet for the small inland lakes, the chief of which are those of the Goëland, of Riche-Pomme and of Pain-de-Sucre ; the largest, that of the Savoyard, which communicates with the sea, covers an area of 44 hectares.

The town of St. Pierre is the capital of the colony. In 1816 it was a small place, but to-day it is a thriving little seaport extending over an area of about 100 hectares. The main part of the town is built in the form of an amphitheatre on the steep slopes of the Calvaire, and faces south-east. To

the north is growing up a new quarter on what was previously waste and marshy land, and already buildings are climbing up the abrupt slopes of the hills which shut in this small strip of coast.

Apart from a few public buildings of stone, all the houses are of wood with double walls of grooved boards carefully put together and provided on the outside with a third covering of bricked boards known as " clabords " which protect them against the damp. This method of building reduces the radiation of heat to a minimum ; it is eminently practical in a country in which the winters are both long and hard.

The St. Pierre roadstead ends to the south-west in a creek named Barachois, which is protected by a mole and shelters the local fishing fleet during the winter season. Around this inlet are grouped store-houses and salting sheds and the houses (*habitations*) which shelter during the summer a large number of people engaged in the preparation and drying of cod.

Owing to its situation the town is directly exposed to the south and south-east winds, which are often accompanied by rain and fog ; but, towards the north and north-west, ranges of steep hills protect it against the cold winds which frequently blow from that direction. The drinking-water is brought from the neighbouring lakes by a canal system serving all the quarters of the town. The town has a telephone system and electric lighting.

The Ile-aux-Chiens lies across the entrance of the St. Pierre roadstead, which it protects against the south winds ; it is the largest of the islets surrounding St. Pierre, from which it is about 900 metres distant to the south.

The Ile-aux-Chiens is 1,800 metres long and measures 400 metres at the widest point ; the south-eastern part is the most populated. The fishermen's houses, most of which consist of only one storey, are built on either side of a road which runs approximately along the crest of this wind- and snow-swept island. Each house has a small garden carefully tended and growing nearly all the vegetables of France. The men engage in the local fisheries during the summer ; the women's work is to prepare the cod and particularly to dry the fish on the beaches ; they also take part in fishing for squids. The winter season is a time of rest for this laborious and thrifty population, which has preserved all the most sound traditions of family life.

The island of Miquelon, separated from St. Pierre by a strait about one league in width incorrectly called " The Bay " is of considerable extent. Its greatest length is 42 km. 800 and its greatest breadth 13 km. 100 ; its area 21,531 hectares. It is divided into two parts—Grande Miquelon and Petite Miquelon, formerly separated by a sandbank which, by the action of the sea, has become silted up since 1783 and has been transformed into an isthmus 9 to 10 kilometres long. The interior of the island is formed by

a succession of flat plains bounded by hills of varying steepness and consisting in great part of peat bogs covered with a tangled carpet of moss. At the foot of these hillocks grow clumps of alders and stunted firs ; at Langlade, however, on Petite Miquelon, there are trees of finer growth reaching 6 metres in height. At the bottom of the ravines flow thin trickles of water which become torrents when the snow melts ; they broaden out in the plain and form small lakes and swamps, whose shifting surface is sometimes treacherous. The most important watercourse of Langlade is the Belle-Rivière, whose picturesque banks are much frequented by trout fishers. Some of the lakes are deep and extensive, such as those of Cap Vert, Mirande, and above all the Lake of Miquelon, measuring 3241 metres at its greatest length.

On Grande Miquelon is situated the commune of Miquelon, which has only 534 inhabitants. It is a small fishing village whose wooden houses are dispersed along the shores of a vast bay offering no safe anchorage to ships.

(*b*) Population.

At the 1921 census the population of the colony numbered 3,918 inhabitants ; there are no natives and the descendants of the colonists of Acadia are now very few. Most of the present inhabitants are the children of Bretons, Normans and Basques. A few families come from Newfoundland.

(*c*) Climate.

The islands of St. Pierre and Miquelon, from the meteorological point of view, are situated in the cold zone, on the isotherm which passes to the north of the Faroë Islands and has an annual average temperature of +5°. Unlike certain countries situated on the same line, these islands have not the summers of Paris and the winters of Moscow. The summer is without heat and is similar to that of Archangel. The winter is long rather than severe ; it is the winter of Southern Sweden. Although the thermometer sometimes falls as low as —20°, it may be said that the lowest temperatures vary between —14° and —16°.

The climate is somewhat rough. It is under the direct influence of winds which carry with them to some extent the temperatures of the districts they have traversed.

During the winter, winds blowing from the north-west and west pass over the vast ice-fields which block the St. Lawrence and considerably lower the temperature ; sharp frosts always coincide with winds coming from this direction.

During the fine season the dominating winds blow from the south-west or south (Gulf Stream) and bring with them the warm air and mists of these regions.

Snow begins to cover the ground in the second half of November and often lies until the beginning of May ; snowfalls are heaviest in December and January. Under the influence of the north and north-east winds, which often blow with hurricane strength, this powdered snow is lifted up in whirlwinds known as the " *poudrin* ". At such times, like the sands of the desert driven by the sirocco, the snow fills and thickens the air ; it makes breathing difficult, burns the eyes and pricks the skin like needles.

Winters are rare in which the pack-ice forms a single block enclosing the whole group of small islands in the neighbourhood of St. Pierre ; but frequently a great part of the roadstead is filled with the " cremi ", formed by a mass of small floating lumps of ice which have not coalesced. This light ice, however, is an obstacle which completely precludes the arrival of ships.

Fogs occur particularly during the months of June and July ; they last for entire weeks, during which the sun is seen only at rare intervals.

The average annual rainfall is from 1,000 to 1,200 millimetres : the dampness is great during the period when the earth is not covered by snow, and, owing to the configuration of the soil and its constitution, the water remains on the surface.

(*d*) Economic Survey.

The agricultural resources of the colony are small ; everywhere the arid soil has been left uncultivated and it is only at the cost of the most persevering efforts that the inhabitants have succeeded in laying out small gardens round their houses, in which they grow a few French vegetables. At Miquelon and at Langlade there are several cattle-breeding farms.

The fishing and curing of cod constitutes the sole industry of the country.

The fishing is done by sailing vessels, steam trawlers and small motor-vessels (Warys) on the Great Bank, on the St. Pierre Bank, on the Banquereau and on the coasts of the colony. The fish is landed at St. Pierre, dried and then sent to France and to the French possessions in the West Indies.

The volume of trade due to this industry in the islands of St. Pierre and Miquelon amounts annually to about 42 million tons.

(*e*) Health Organisation.

At St. Pierre there is a hospital which has just been renovated after a fire and is run by the local medical service. In this establishment are treated the patients belonging to the crews of the sailing vessels and trawlers engaged in deep-sea fishing. In 1921 the number of admissions was 265.

The medical staff consists of two doctors of the Colonial Medical Corps. One resides at St. Pierre, where he acts as doctor in charge of the hospital and gives medical attention to the inhabitants of the Ile-aux-Chiens ; the second resides at Miquelon. A naval surgeon is responsible for public health at St. Pierre, where there is also a civilian chemist.

(*f*) Morbidity.

The pathology of the colony is that of cold countries ; nevertheless, the sailors belonging to the crews of the fishing vessels are subject to certain affections which may be termed professional, chief among which we may mention the abscesses, whitlows and plegmons resulting from the cuts caused by hooks, injuries (chiefly broken limbs) caused by the accidents which occur during the frequent storms on the Banks, frostbite of the extremities and, lastly, affections of the respiratory organs (pneumonia, bronchial-pneumonia). Typhoid fever seems to have become rarer in the last few years.

1. *Tuberculosis.*

Despite a distinct improvement in the conditions of life of the population, tuberculosis is still a formidable danger.

The chief causes of the gravity of this evil, according to Dr. Pons, are the following :—

(1) The " *habitations* " which are wooden houses with low ceilings, overheated by iron stoves of excessive size, with the consequent insufficient ventilation and over-crowding in small rooms ;

(2) The *winter season,* involving over six months' confinement in an unhealthy atmosphere ;

(3) The nourishment, which comprises little meat and a great deal of salt or fresh fish and stimulating drinks (tea and coffee) ;

(4) Lastly, *alcoholism*, which, although decreasing, is still the most frequent cause of infantile debility and of physical and moral degeneracy among adolescents and adults.

Promiscuity and overcrowding are the chief causes of contagion. The severity of the winter encourages family gatherings, and if it can be said that in France tuberculosis is caught at the public house, it may be said that in St. Pierre and Miquelon tuberculosis is caught and spread at home.

For over a century tuberculosis has been the centre of gravity of the entire pathology of these islands. All the doctors have pointed out the serious consequences of this terrible disease on the population. The meningeous form is the most frequent and undoubtedly accounts for a great part of the infant mortality.

During the year 1920, in the single commune of St. Pierre, out of a total of 64 deaths, 59 of which were due to perfectly well-ascertained causes, 16 deaths from tuberculosis were noted, giving a coefficient of 5.16 per 1,000 inhabitants, whereas in France for the whole population the coefficient of mortality was 1.66 in 1911. At Miquelon in 1920, out of six deaths, four were due to tuberculosis.

While in the great majority of cases, particularly among adolescents, the galloping forms of phthisis (normal course from six months to one year) are observed, there are a considerable number of patients having already developed cavities who are given up for lost and yet live to a great age, spreading the disease all around them.

Considering the great number of persons suffering from the disease and of deaths occasioned by phthisis, and the comparatively high number of persons who, although at an advanced stage of the disease, yet survive, we are led to enquire what part is played by climate in the evolution of tuberculosis.

The observations made may perhaps be summed up in the four following axioms :—

(1) The conditions of life and of the dissemination of the virus predispose the population to infection and re-infection on a large scale ;

(2) The periods of congestion and softening are very rapid, which increases the gravity of the disease ;

(3) Cases in which cavities have appeared often develop into the sclerous form and the patient may then survive until old age ;

(4) The evolution of pulmonary phthisis is rapid among children, very rapid among adolescents, slow among adults and very slow among aged persons [1].

2. *Alcoholism.*

Apart from tuberculosis, alcoholism is of all diseases that which takes heaviest toll of the population of the colony.

Spirits are taken sometimes with coffee but often neat immediately upon awaking and before any food, and the " *boujaron* " is renewed several times during the day to pass the time between meals. Cases of violent drunkenness are comparatively rare ; but chronic drunkenness slowly and unobtrusively does its work and ruins the health of its unhappy victims.

There exists an isolation hospital at the Ile-aux-Vainqueurs ; it has scarcely been used except for the isolation of smallpox cases many years ago. Other so-called pestilential diseases have never occurred in the colony, with the exception of influenza, which in 1920 caused 45 deaths, 42 of which were in the town of St. Pierre.

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[1] Pons, " Note on Tuberculosis in the Islands of St. Pierre and Miquelon " (*Annals of Colonial Medicine and Pharmacy*, 1922, page 5).

CHAPTER III.

INDIAN OCEAN GROUP.

A. Madagascar. — B. French Somali Coast. — C. French settlements in India. — D. Réunion.

A. MADAGASCAR.

(*a*) Geographical Survey.

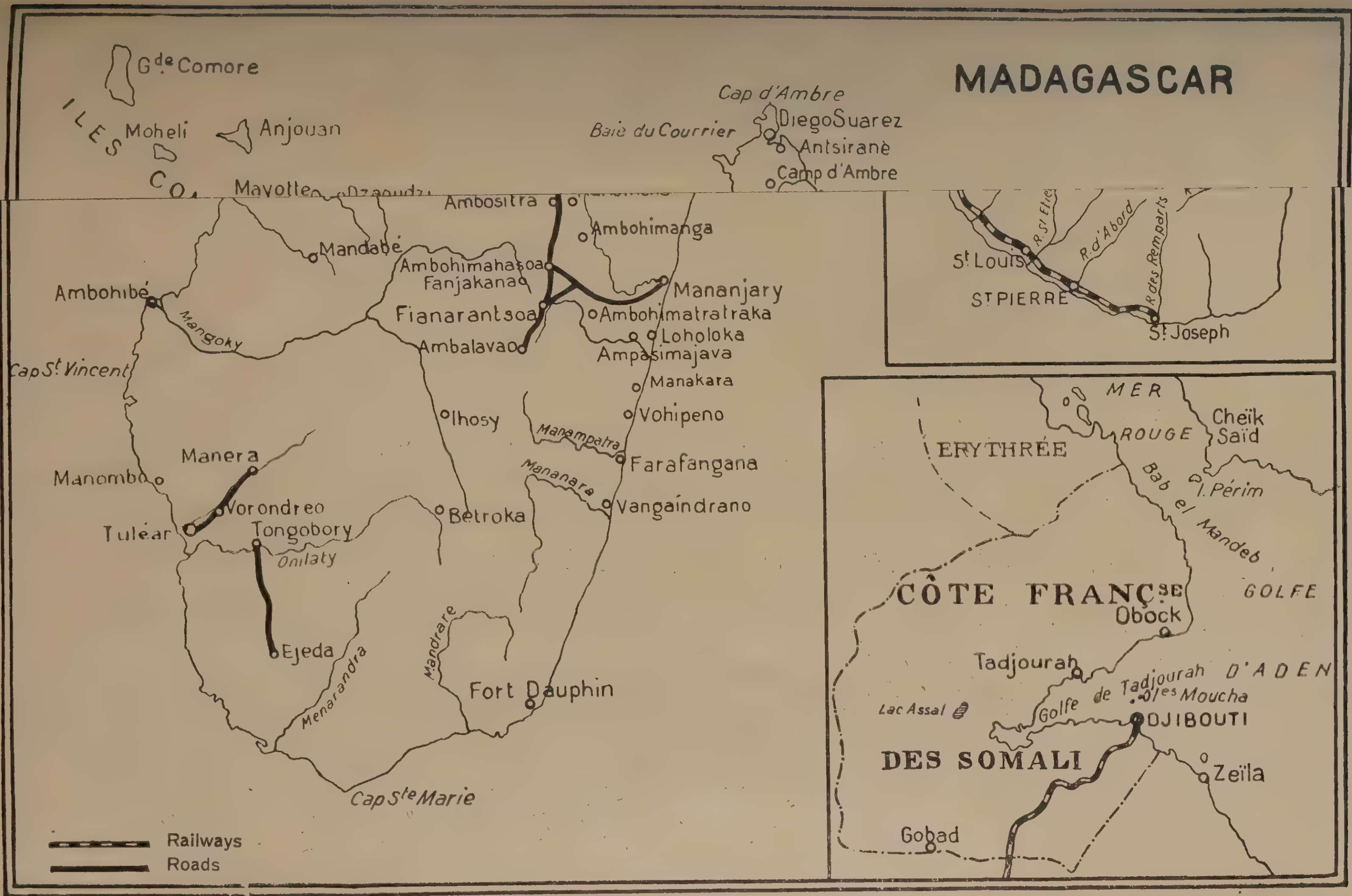
Madagascar, the " Great Island " of the Indian Ocean, lies more than 400 kilometres from the east coast of Africa, from which it is separated by the Mozambique Channel. Its area—598,000 square kilometres—is equal to that of France, Belgium and Holland combined. It is very mountainous except for the vast plain of Sakalave in the West. The general mountain system consists of an immense plateau occupying the whole centre of the island and composed of two quite distinct regions—the central plateau (Imerina and Betsileo) and the plateau of Akkaisina in the north of the island.

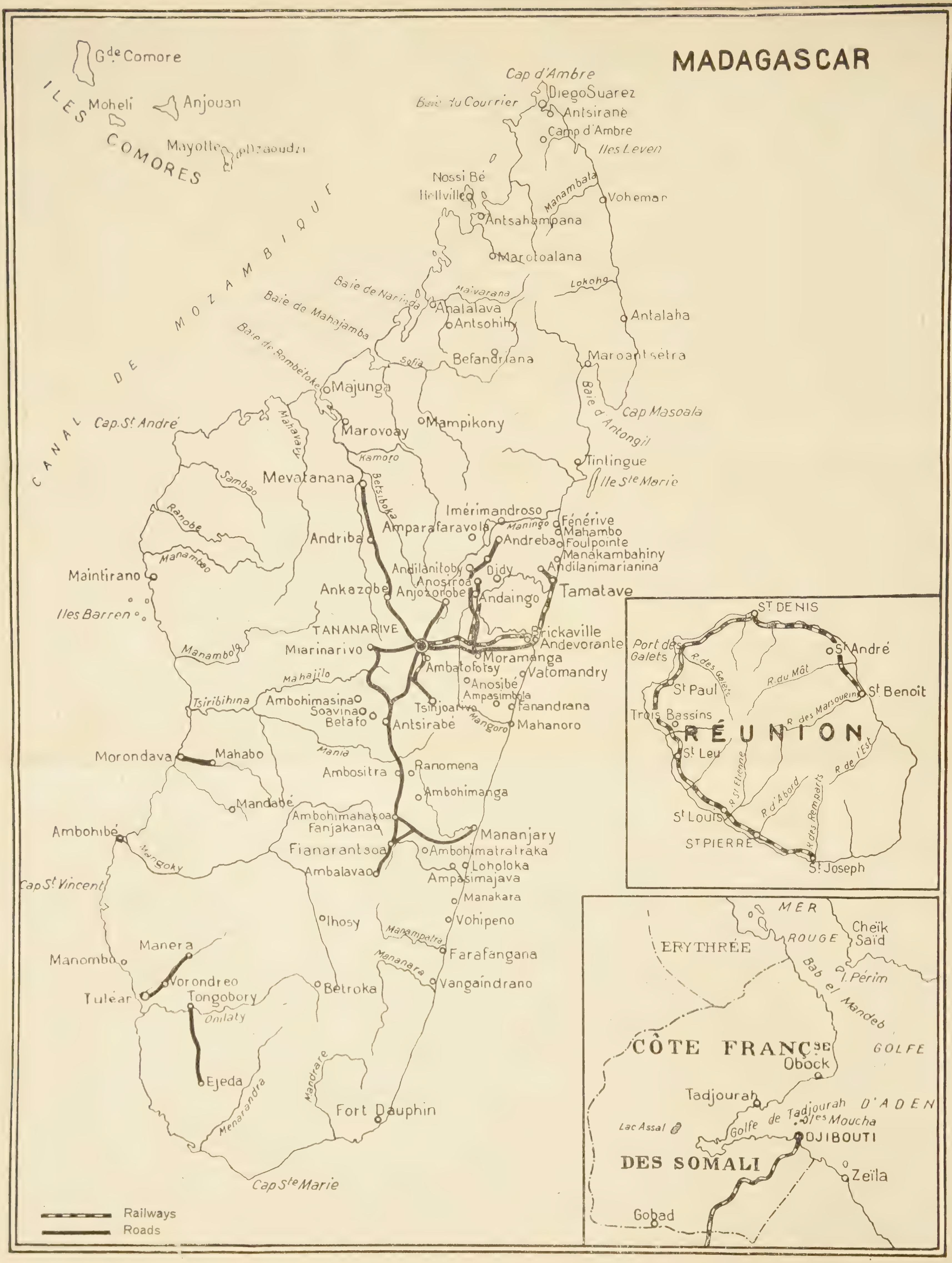
Hydrographic conditions are very different on the two main slopes of the island. The chief rivers on the eastern side rise some thirty leagues from the coast and are torrential watercourses, navigable only as far as 20 kilometres from their mouth. On the west coast, on the other hand, the rivers flow between marshy banks and are navigable for distances of 100 to 150 kilometres. They are : the Mahavary, the Betsiboka, the Mangoka, the Onilahy, etc.

The principal ports of Madagascar are : on the east coast, Diégo-Suarez, which has a magnificent roadstead, Tamatave, Andevorante, Massanjary and Fort-Dauphin ; and on the west coast, Nossi-Bé, Analalava, Majunga, Morondava and Tuléar.

(*b*) Climate.

According to its latitude, Madagascar is a tropical region, but from the coast to the mountains of the interior there is a regular fall in the mean temperature. At Antananarivo in the uplands, the winter temperature rarely drops below 4° or 5°. At Tamatave, by the sea, the summer heat does not exceed 34°, though further north the temperature is two or three degrees higher.


MADAGASCAR
Gde Comore
ILES
Moheli
Anjouan
Mayotte
Cap d'Ambre
Baie du Courrier
Diego Suarez
Antsirane
Camp d'Ambre
Ambositra
Ambohimanga
Mandabé
Ambohimahasoa
Fanjakana
Ambohibé
Mangoky
Fianarantsoa
Mananjary
Ambohimatratraka
Loholoka
Ambalavao
Ampasimajava
Cap St Vincent
Manakara
Ihosy
Vohipeno
Manampatra
Farafangana
Mananara
Manera
Manombo
Vorondreo
Betroka
Vangaindrano
Tuléar
Tongobory
Onilaty
Ejeda
Menarandra
Mandrare
Fort Dauphin
Cap Ste Marie
Railways
Roads
St Louis
St PIERRE
St Joseph
R. St Etienne
R. d'Abord
R. des Remparts
MER
ROUGE
Cheïk Saïd
ERYTHRÉE
I. Périm
Bab el Mandeb
GOLFE
CÔTE FRANÇSE
Obock
Tadjourah
D'ADEN
Golfe de Tadjourah
Iles Moucha
Lac Assal
DJIBOUTI
DES SOMALI
Zeïla
Gobad


MADAGASCAR
Gde Comore
Moheli
Anjouan
Mayotte
ILES COMORES
CANAL DE MOZAMBIQUE
Cap d'Ambre
Diego Suarez
Antsirane
Camp d'Ambre
Baie du Courrier
Iles Leven
Nossi Bé
Hellville
Manambato
Vohemar
Antsahampana
Marotoalana
Lokoho
Baie de Narinda
Maivarana
Analalava
Antsohihy
Antalaha
Baie de Mahajamba
Baie de Bombetoke
Sofia
Befandriana
Maroantsetra
Majunga
Mahavavy
Cap St André
Marovoay
Mampikony
Baie d'Antongil
Cap Masoala
Kamoro
Tintingue
Ile Ste Marie
Mevatanana
Betsiboka
Sambao
Imérimandroso
Ranobe
Amparafaravola
Maningo
Fénérive
Mahambo
Foulpointe
Andriba
Andreba
Manakambahiny
Manambao
Andilanitoby
Didy
Andilanimarianina
Maintirano
Anosiroa
Ankazobe
Anjozorobe
Andaingo
Tamatave
Iles Barren
TANANARIVE
Brickaville
Andevorante
Manambolo
Miarinarivo
Moramanga
Ambatofotsy
Vatomandry
Mahajilo
Anosibé
Ampasimbola
Tsiribihina
Ambohimasina
Soavina
Tsinjoarivo
Fanandrana
Betafo
Antsirabé
Mangoro
Mahanoro
Morondava
Mahabo
Mania
Ambositra
Ranomena
Ambohimanga
Mandabé
Ambohimahasoa
Fanjakana
Mananjary
Ambohibé
Fianarantsoa
Ambohimatratraka
Mangoky
Loholoka
Ambalavao
Ampasimajava
Cap St Vincent
Manakara
Ihosy
Vohipeno
Manampatra
Manera
Farafangana
Manombo
Mananara
Vorondreo
Vangaindrano
Tuléar
Tongobory
Betroka
Onilahy
Mandrare
Ejeda
Menarandra
Fort Dauphin
Cap Ste Marie
Railways
Roads
ST DENIS
Port des Galets
R. des Galets
St André
R. du Mât
St Paul
St Benoit
R. des Marsouins
Trois Bassins
RÉUNION
St Leu
R. St Etienne
R. de l'Est
R. d'Abord
R. des Remparts
St Louis
ST PIERRE
St Joseph
MER ROUGE
ERYTHRÉE
Cheik Saïd
Bab el Mandeb
I. Périm
CÔTE FRANÇSE
DES SOMALI
GOLFE D'ADEN
Obock
Tadjourah
Golfe de Tadjourah
Iles Moucha
Lac Assal
DJIBOUTI
Zeïla
Gobad

The south-east trade winds, in the path of which the whole of Madagascar lies, are as a rule deflected from their course through the heat of the land. They usually blow direct from east to west, and are most regular in this respect during the dry season (April to September). When, however, the sun returns more towards the south bringing clouds and rain, the wind changes its direction and becomes the north-west monsoon. This is the winter season (October to March), during which storms are frequent and violent cyclones also occur at times.

In the south and south-west, falls of rain are slight and of short duration. Water is very scarce in this region, which is aptly called " the country of thirst ".

(*c*) Population.

The population of Madagascar was estimated in 1922 at 3,350,465. The inhabitants belong to various tribes, namely : the Hovas, who occupy a large part of the central plateau (Imerina) ; the Betsileos, who come from the provinces of Fianarantsoa and Ambositra, south of Imerina ; the Betsimisaraka on the east coast ; the Sakalava, who occupy the whole western part of the island and the north-west coast ; the Bezanozano-Sihanaka, inhabiting the Mangoro basin ; the Tanala, or people of the forest, who are scattered throughout the provinces of Mananjary, Ambositra, Fianarantsoa and Betroka ; the Baru, grouped south-east of Betsileo ; the Antaisaka in the south ; the Antaimoro on the east coast ; the Antankaro in the north near Diego-Suarez ; the Tsimihety in the west, in the provinces of Analalava and Maroantsetra. Space does not permit of a description of the distinctive characteristics of these various native races ; moreover, these characteristics are nowhere preserved intact, owing to the extent to which the population has become intermixed.

In 1922, births numbered 72,917 and deaths 66,673. The birth-rate is thus 21.7 and the death-rate 19.8 per thousand.

(*d*) Administrative Organisation.

The colony of Madagascar comprises the island of Madagascar itself, the islands of Nossi-Bé and Ste.-Marie, the island of Mayotte and the Comores (Grande-Comore, Anjouan and Mohéli). These territories are combined under a general government, with its capital at Antananarivo. At the head of each province is an administrator-in-chief, assisted by subordinate administrators for the various districts. The territory is policed by a local militia, under European officers.

(*e*) Economic Survey.

Rice, which is the staple food of the natives, is grown throughout the island, except in the desert region in the extreme south. The fields are still tilled with the spade, and the number of labourers required is very

large. Up to 1900, the rice crop was not sufficient to supply the home demand, and rice had to be imported from India and Cochin-China. For several years now, however, the crop has greatly increased, and in 1923 Madagascar was able to export 53,325 tons of rice, representing a value of more than 30 million francs.

Cape peas, grown in the south, in the neighbourhood of Tulear, are exported to England ; the Customs statistics for 1923 show exports amounting to 14,600 tons, the value being estimated at over 10 million francs.

Mention should also be made of manioc, dried or in the form of flour (exports : 27,000 tons, value $8^1/_2$ million francs), and frozen beef and pork (exports : 4,600 tons, value 5,900,000 francs). In that year the colony also sent 2,930 head of live cattle to Reunion and 13,912 to Mauritius.

On the north-east coast, at Antalatra and Sambara, the cultivation of vanilla has greatly increased. It is almost entirely in the hands of a Chinese colony which was formed some years ago, and includes Chinese women. In 1923, 823,391 kilograms of vanilla (value 28 million francs) were exported. At Nossi-Bé the cultivation of Ylang-Ylang proved very successful ; the quantity of essence exported amounted to 11,000 kilograms (value 1,768,000 francs). At Ste.-Marie the amount of clove essence produced exceeded 17,000 kilograms. More than 5 million francs' worth of raffia was exported in 1923.

The mineral products exported included 10,767 tons of graphite, 1,086 kilograms of precious stones, 451 kilograms of gold.

The total trade figures (imports and exports combined) for 1923 amounted to 401,659,078 francs.

In that year the local budget estimates amounted in all to 86,692,468 francs.

(*f*) Organisation of the Health and Medical Services.

At the head of the Native Medical Relief Service and the Public Health Service of the colony is the Director of the Health Service of the colony. who is a Medical Inspector of Colonial Troops ; he is assisted by a Central Advisory Board sitting at Antananarivo.

In the different provinces, the Administration is responsible for the satisfactory working of the Native Medical Relief Service. To this service is attached a European doctor, who has the rank of Medical Inspector and under whose authority the native medical officers are placed. There is a provincial board to which all proposals affecting the organisation and operation of the Medical Relief Service are referred. This service is entirely independent as regards finance ; it has a separate budget, the credits for which are covered by the public relief tax and by subsidies from the local budget.

The public relief tax is levied on all male adult natives not recognised by the administrative authorities as indigent.

The rate of the tax varies in the different provinces according to the wealth of the population. It may be changed from year to year by decision of the administrative head of the colony at the time when the budget is passed.

In return for this tax the natives are entitled to free medical treatment, medicine and dressings for themselves and their families.

In 1924 the expenditure under the autonomous budget of the Medical Relief Service amounted to 7,384,468 francs (2,651,331 for personnel and 4,733,155 for material). This sum represents 8.51 per cent of the expenditure under the local budget (86,692,468 francs).

(*g*) European Health Personnel.

There are at present in Madagascar 33 officers of the Colonial Medical Corps. They are distributed as follows : seventeen in the general service ; eight attached to European and native troops, and seven unattached, belonging to the Native Medical Relief Service. This service also includes eight European civilian doctors engaged by contract.

There are six European private practitioners—two at Antananarivo, two at Tamatave, one at Diego-Suarez and one at Majunga.

The staff of the pharmaceutical chemists comprises three pharmacists of Colonial Troops, for the general hospitals at Antananarivo and Diego-Suarez ; one civilian pharmacist for the central pharmacy of the Medical Relief Service and eight private civilian pharmacists, four at Antananarivo, two at Tamatave and two at Diego-Suarez.

Six European female nurses and 34 male army nurses are employed at the hospital establishments of the General Service (colonial budget). To this personnel must be added 109 native male army nurses from the colonial nurses section.

(*h*) Native Health Personnel.

The native health personnel of the Medical Relief Service consists of the following :—

Doctors	188
Midwives	142
Nurses (female)	152
Nurses (male)	258

(*i*) Public Health Institutions.

The colony of Madagascar at present possesses :—

(1) Under the colonial budget : two hospitals at Antananarivo and

Diego-Suarez ; two ambulances at Tamatave and Majunga ; seven garrison infirmaries.

(2) Under the budget of the Medical Relief Service for natives :—

41	hospitals with maternity wards	1,821 hospital beds.
8	hospitals without maternity wards	
9	separate maternity hospitals	1,077 hospital beds.
50	medical stations with maternity wards	
53	medical stations (without maternity wards).	
23	leper-hospitals.	
2	lunatic asylums (at Angahannansatisa, near Antananarivo and the island of Sakatia, near Nossi-Bé).	
45	anti-venereal dispensaries.	
1	Red Cross dispensary (*Goutte de Lait*).	
1	sanatorium for tuberculous patients.	

The native hospitals of the Medical Relief Service are distributed among the various provinces. The number varies in each province according to the size of the population, thus the province of Antananarivo has eight hospitals, that of Itasy five, that of Vakinankaratra four. These establishments are situated in the most populous centres. Patients are given treatment free of charge, although in some hospitals, wards and even separate rooms for paying patients have been established at the request of the public, the charges made being strictly moderate. All these hospitals have consulting-rooms, which are open daily and at which patients can obtain medical advice and dressings free of charge.

Patients are attended by a native doctor who acts as medical superintendent of the hospital. He is assisted by male and female nurses who belong to the Medical Relief Service and are usually recruited in the locality. In most cases they rapidly acquire adequate professional qualifications and render very useful service.

These hospitals are under the supervision of the Medical Inspector of the province, who visits them at frequent intervals and inspects all the administrative details of the service.

Maternity hospitals play an important part in the organisation of the Medical Relief Service. In many provinces the women have no hesitation in entering them during confinement, and so avoid employing untrained midwives who, ignorant of the most elementary principles of hygiene and with no notion whatever of obstetrics, are a source of danger to the mother and child alike.

In these maternity hospitals midwives may also be consulted by women during pregnancy, and mothers may obtain advice as to the feeding of their children. They thus help to spread valuable notions regarding the rearing of children among the more backward elements of the native population where there is a total ignorance of hygiene.

Medical stations are established in centres which are situated at a long distance from hospitals or in the more inaccessible parts of the country. Where possible these stations are placed in villages at which a fairly large market is periodically held so that the peasants can consult the doctor when attending the market. The doctors, besides giving consultations at the medical station, are also required to go on tours fixed by the Medical Inspector of the province. On these tours, the doctor stops at every little village on his route, his arrival being notified in advance, gives consultations to patients or visits them in their homes, and distributes medicine from his travelling pharmacy. He also has to call a meeting of the inhabitants and give them a short lecture on some subject of practical hygiene such as will be intelligible to all and will leave a definite impression on the minds of his audiences. The natives of Madagascar are always willing to listen to speeches (*kabarys*) and sometimes derive some small benefit from them.

(*j*) Scientific Institutes.

These are all situated at Antananarivo, and include :—

A Pasteur Institute, with vaccination centre, where calf-lymph vaccine is prepared for the whole colony, and a School of Medicine for natives (see Part I).

(*k*) Results.

The results obtained by the Medical Relief Service for natives in 1924 may be summarised as follows : —

Number of hospital cases	32,645
" " days' treatment in hospital	158,811
" " confinements in maternity centres	27,271
" " patients attending consultations .	1,740,804
" " consultations	5,288,766
" " persons placed in leper-hospitals .	3,217
" " persons placed in lunatic asylums .	175
" " vaccinations	193,300

(*l*) Survey of Health Conditions.

1\. *Malaria* in the commonest endemic disease in Madagascar itself. In 1922 it accounted for nearly one-third of the general morbidity among Europeans and nearly a quarter of the general morbidity among natives. No part of the colony is free from it. The provinces where it is the commonest are those on the coast, but it also exists in Emyrne and Betsileo, which lie on a high plateau. Indeed for several years there has been a recrudescence of malaria in those regions. At Antananarivo, malaria is responsible for a

yearly total of about 50 deaths out of a population of 6,000. A splenic index varying from 90-96 per cent was observed in the province of Itasy (Marissarivo), which on its western side borders upon Antananarivo. This recrudescence is coincident with an increase in mosquitoes' anopheles for which the methods now adopted in the rice plantations are responsible. These used to be drained immediately after the harvest, whereas now the water is allowed to remain in order to make the roots of plants decay more quickly. There is also another cause ; the inhabitants used to build their dwellings in the higher regions in order to protect themselves from the attacks of nomad bands, but they now live in the plains, in the immediate vicinity of the rice plantations. In consequence they are more exposed to the bites of mosquitoes, against which, moreover, they take no precautions at all.

The breeding of fish in the irrigation canals and rice-fields recommended by Dr. J. Legendre (Senior Medical Officer) would be useful in two ways : it would help to destroy a large number of anopheles larvæ and would provide the people with food to which they are very partial and which would add to the value of their rice-fields.

Every known form of endemic malaria is found in Madagascar. The worst forms, however, are commonest in the hottest districts.

Hæmoglobinuric gall fever is fairly common on the coast, in Nossi-Bé, in the Comores, and at Diégo-Suarez. It occurs generally at the beginning of the cool season, and the sudden cold undoubtedly plays an important part in the œtiology of hæmoglobinuric attacks. The Hovas, who live by the sea, appear to be particularly susceptible to this form of malaria. Native officials are therefore very reluctant to move to places far from the high plateaux. At the same time, despite the best advice, they take no precautions whatever against malaria. The same is true of the settlers from Réunion, who live in large numbers on the east coast and also at Antananarivo. They have the same mentality as the natives of Madagascar themselves and are equally contemptuous of prophylactic measures against malaria. Quinine has a very bad reputation among them and they generally refuse to take it.

In 1921 the Governor-General of Madagascar established an *Anti-malaria* Service. Drs. Bouffard and Couvy, who have been successively in charge of it, realised, as a result of the study of the splenic and plasmodic indices, how widespread malaria was on the high plateaux and discovered the presence of three species of *plasmodia* (*vivax*, *preacox*, *malariæ*).

The campaign carried out in 1923-1924 in the province of Itasy was organised on the following lines :

(*a*) Propaganda was carried on among officials and teachers as well as among the natives, by means of lectures, pamphlets and posters.

(*b*) Splenic and plasmodic indices were ascertained.

(*c*) Before the beginning of the dangerous season, an endeavour was made to reduce the virus centres by sterilising children found to be infected with malaria parasites.

(*d*) During the malaria season patients were given treatment and so far as possible sterilised. Quinine was regularly administered free of charge to all the children in the infected districts and to all pregnant women.

(*e*) Measures of anti-larval prophylaxy were applied (drainage and similar works are in course of execution).

The results of this policy were most encouraging. The number of deaths in the province during the four months in which malaria is rife (March to June) fell from 1,193 in 1923 to 769 in 1924—a reduction of 423, representing an improvement of 35 per cent on previous years. Among children the reduction of mortality was even greater ; in March 1924, 83 deaths of children were registered, and in April 74, as against 116 and 124 in 1923.

2. *Plague* appeared at Antananarivo in June 1921. It appears to-day to be firmly established there and has spread to the provinces (Moramanga, Tamatave, Fort-Dauphin, Itasy, Ambatondrazaka, Diego-Suarez, etc.). The statistics of the epidemic are as follows : in 1923, 720 cases diagnosed and 630 deaths—mortality 87.5 per cent ; these figures include 125 cases and 122 deaths (mortality 97.6 per cent) in the town of Antananarivo, and 577 cases and 490 deaths (mortality 84.9 per cent) in the province of Antananarivo. In 1924 the figures for all the provinces were 1,605 cases and 1,402 deaths (mortality 87.3 per cent), including 75 cases and 70 deaths in the town of Antananarivo (mortality 93.3 per cent), and 1,290 cases and 1,173 deaths in the province of Antananarivo (mortality 90.9 per cent).

Drastic measures have been taken against rats. All premises containing stores of provisions which might serve as food for rats have been rendered rat-proof (wiring of ventilators, openings, etc.).

Household refuse is burnt in special furnaces and night-soil deposits are no longer allowed. Moreover, all new houses must be built with foundations and basements of hard material up to a height of 90 centimetres above ground.

Gangs are employed on the deratisation of premises which are infected or suspected of infection. Efforts are being made to clear out rat burrows in dykes and embankments of rice plantations by means of asphyxiating gases such as chloropicrine. Premiums are also paid for the capture of rats. At Antananarivo in the period January-June 1924 the number of rats thus destroyed was 593,100. A service has been organised for the purpose of discovering cases of plague. Persons infected with pulmonary

plague are treated in their own homes after all the other occupants have been removed. One person only is allowed to remain with the patient, and has to take all the necessary prophylactic measures (the wearing of a mask, glasses, etc.) ; the house is isolated by a police cordon ; all persons who have come into contact with the patient are interned in isolation camps, in a special quarter of which cases of bubonic plague are also treated. Special precautions are taken in the burial of persons who have died of plague.

Unfortunately it is to be feared that these measures will not produce all the results they should since they are ill-understood by the native population and even actively resented. It will be long before the natives can be brought to change their uncleanly habits and their indifference to all matters of hygiene, or before overcrowding and promiscuity in native dwellings can be abolished.

3. *Pneumonia.* — Every year during the cool season there occur numerous cases of *pneumonia*, which develop very rapidly and usually end fatally. There are thus veritable epidemics of pneumococci, in which meningitis plays an important part, particularly among children.

All that has already been said regarding the insanitary conditions under which the natives live, particularly the village peasants, their indifference to hygiene, the overcrowding of families in small and ill-ventilated huts, sufficiently explains the spread of pneumococcic diseases. Moreover, a marked predisposition exists due to malaria, which is particularly rife during the rainy season and at the beginning of the cool season. It undermines the constitutions of the natives, already weakened by inadequate feeding, so that their systems can offer no resistance to the disease.

4. *Tuberculosis.* — The doctors living in Madagascar are unanimously of opinion that there is less tuberculosis there than in France.

At Antananarivo, according to Clarac, the mortality from tuberculosis is 6.45 per thousand ; the disease appears to be comparatively rare among the natives. According to statistics extending over 19 years, the number of cases of tuberculosis, out of a total figure of 57,491 persons examined, was 638, or 11 per thousand. At the same time Dr. Thesen, of the Norwegian Mission, thinks that the disease is increasing on the central plateau. The natives on the coast are not more subject to attack than those on the plateaux, but the malady, once acquired, develops more rapidly and in a severer form.

5. *Venereal Diseases.* — The lax morals of the inhabitants of Madagascar were long ago noted by the navigators of the Royal East India Company, who established agencies there, and the Chevalier de Flacourt wrote that in Madagascar " a girl will not marry a boy unless she has previously taken him on a long trial more than once. " The account which the Surgeon

Dellon gives of a voyage on one of the company's vessels, *La Force*, is entirely devoted to " venereal disease in the Ile Dauphine ".

These customs have not changed, and the virus of the disease still causes great ravages among the population of Madagascar. Every year more than 100,000 persons present themselves at the public health institutions for consultations, and the native maternity statistics for 1920 show that 43.49 per cent of the children are born syphilitic. In the same year, out of a population of 3,500,000, the births only exceeded the deaths by 7,863.

The Government of Madagascar could not remain indifferent to the extremely serious situation created by venereal disease. An active campaign against " the venereal peril " was inaugurated in 1921 by Dr. Allain, Medical Inspector and Director of the Public Health Service. It proved a success, thanks to the Native Medical School at Antananarivo, which supplied the medical staff necessary to operate the numerous dispensaries.

Indeed, the whole policy adopted in regard to venereal prophylaxy centres around this specialised public health unit. The dispensaries are in charge of native doctors under the supervision of a European doctor, an inspector of the A.M.I. [1] The former are also required to carry on propaganda, to urge the adoption of prophylactic measures, and distribute tracts and pamphlets describing the dangers of venereal disease and indicating the days, hours and places appointed for consultation. This campaign of publicity was welcomed by the population, which did not regard infection with the disease as in any way shameful, and its success was increased by the use of arseno-benzols, which effect " miraculous " cures by healing syphilitic lesions with remarkable rapidity.

The number of dispensaries, only seven in 1920, had increased in 1924 to 73. They are distributed as follows :—

Antananarivo, town	3
Antananarivo, province	6
Ambositra	4
Analalava	1
Betroka	1
Diego-Suarez	3
Farafangana	1
Fianarantsoa	2
Fort-Dauphin	5
Itasy	1
Maevatanana	4
Majunga	4
Mananjary	3
Maroantsatra	5
Carried forward	43

[1] Assistance Médicale Indigène.

Brought forward	43
Mayotte	1
Moramanga	9
Morondava	1
Nossi-Be	1
Tamatave	13
Tulear	2
Vakianankaratra	3
Total	73

The number of consultations has also steadily increased. The figures are as follows :—

1921	1922	1923	1924
24,714	60,227	146,697	202,629

The recruiting boards already state that specific symptoms among recruits are less numerous than formerly.

The anti-venereal organisation will shortly be completed by the establishment, in the vicinity of dispensaries and maternity centres, of laboratories for serological tests (Wassermann) and syphilimetric research according to the Vernes method, which will ultimately make it possible to follow the evolution of syphilis.

6. *Leprosy*. — It has not yet been possible to determine the exact number of lepers in Madagascar, but the number of inmates of leper-hospitals (3,217) is sufficient to show that this disease is far from rare in the colony. Leprosy was known there before the arrival of the French, and the natives were aware of its contagious character ; in certain regions, indeed, they had even taken steps to isolate lepers.

Lepers are now interned in establishments which are in the nature of agricultural settlements, and they carry on their ordinary occupations there.

The question of leper-hospitals forms the subject of a special chapter in the present report.

(*m*) Maritime Health Police.

The Maritime Health Police Service is in charge of the Director of the Public Health Service.

The colony is divided into three public health districts, each under a Chief Public Health Officer. They are as follows :—

1. District of Diego-Suarez. — The Chief Public Health Officer is the Chief Medical Officer of the hospital. The port has sanitary equipment

(Géneste-Herscher steam-bath, Clayton apparatus, pulverisers, etc.). In the roadstead of Diego, on the island of Nossi-Koba, there is an isolation hospital for infectious diseases.

2. Majunga. — The duties of Chief Public Health Officer are carried out by the medical officer in charge of the ambulance station. There is a disinfecting station on the landing quay. There is also an isolation hospital at Katsepe on the other side of the roadstead, with all the material necessary for the disinfection and treatment of patients.

3. Tamatave. — The medical officer in charge of the ambulance also acts as Chief Public Health Officer. The port isolation hospital is situated on the island of Prune outside the roadstead, and is not always easy of access. There is also in the neighbourhood of Tamatave station a disinfecting centre equipped with a steam-bath, Clayton apparatus and sulphurisation chamber, and has proved most useful during outbreaks of plague.

NATIVE MEDICAL RELIEF SERVI

Province or autonomous district	Population	Number of Hospitals	Number (of days) treatment	Number of medical stations	Number of maternity homes	Number of persons attending consultations	Number of consultations	Number
Ambositra	188,139	2	19,259	6	9	108,834	137,755	2,[illegible]
Analalava	131,400	2	34,050	6	3	36,413	55,332	[illegible]
Antananarivo, T. .	62,301	1	49,541	—	1	—	44,657	[illegible]
Antananarivo, P. .	528,561	10	59,903	25	22	530,769	696,652	9,[illegible]
Betroka								
Diego-Suarez . . .	86,694	4	26,542	2	3	35,088	47,890	[illegible]
Farafangana . . .	181,657	2	34,117	13	9	79,336	168,873	2,[illegible]
Fianarantsoa, T. .	7,161	1	34,598	1	1	28,896	35,221	[illegible]
Fianarantsoa, P. .								
Fort-Dauphin . .	222,249	2	20,401	7	2	62,937	129,179	[illegible]
Itasy	76,826	2	14,213	7	4	112,998	148,909	[illegible]
Maevatanana . . .	82,479	3	12,305	3	7	41,367	61,404	1,[illegible]
Majunga	123,366	2	25,429	5	4	60,405	127,807	[illegible]
Mananjary . . .	162,339	2	24,719	5	2	75,157	89,778	[illegible]
Maroantsetra . . .	86,318	2	25,491	3	2	27,666	41,606	[illegible]
Mayotte	138,302	5	27,107	1	—	30,035	49,278	
Moramanga . . .	125,103	1	5,842	12	7	110,303	158,737	1,[illegible]
Morondava . . .	123,063	2	13,175	14	5	64,981	102,463	[illegible]
Nossi-Be	36,424	1	5,948	1	—	15,050	28,629	
Sainte-Marie . . .	9,278	—	6,144	1	1	6,116	13,881	
Tamatave	143,642	4	31,368	8	7	74,083	108,772	[illegible]
Tulear	171,299	2	20,747	5	3	77,600	125,549	[illegible]
Vakianankaratra .	160,011	3	32,290	3	8	118,252	155,956	2,2[illegible]
Vatomandry . . .	128,913	2	28,622	4	4	47,438	66,438	[illegible]
TOTAL . .	2,976,525	55	538,811	132	104	1,740,804	5,288,766	27,2[illegible]

MADAGASCAR, 1923.

emography		Vaccinations		Leper Hospitals		Lunatic Asylums		Number of beds		Number of patients treated during the year			Deaths
	Deaths	1st vaccinations	Re-vaccinations	Number of hospitals	Number of inmates	Number of asylums	Number of inmates	Hospitals	Maternity homes	Number on Jan. 1st	Entered during the year	Number on Dec. 3rd	Inmates of hospitals
,724	3,887	8,230	14,432	—	27	—	—	94	144	51	1,770	37	128
,012	1,984	6,622	4,412	1	44	—	—	61	32	92	1,451	89	38
,083	2,151	—	—	—	—	—	—	162	—	102	2,299	112	380
,743	14,376	11,473	13,359	1	933	1	168	299	209	127	4,322	125	482
,294	1,328	4,324	2,095	1	92	—	—	93	18	70	1,162	68	80
,595	4,310	16,555	9,630	1	394	—	—	85	158	51	1,500	52	57
637	226	847	3,875	3	423	—	—	72	22	85	1,899	92	130
001	1,802	39,921	15,715	—	—	—	—	60	12	47	824	64	67
109	3,852	5,043	3,964	—	—	—	—	70	65	47	1,069	35	124
738	1,835	2,233	3,206	1	33	—	—	59	40	67	704	61	66
347	1,848	2,747	1,918	—	—	—	—	68	22	61	1,187	62	86
735	2,469	7,779	5,134	—	—	—	—	62	10	82	1,387	58	63
239	992	4,960	2,068	—	—	—	—	59	37	80	1,318	60	38
359	1,085	3,744	3,213	4	153	—	—	76	—	63	1,406	69	22
597	2,748	16,990	12,304	—	—	—	—	20	101	14	448	22	48
705	2,011	3,809	2,909	1	16	—	—	86	24	43	675	34	157
673	620	3,927	3,984	1	28	1	7	57	3	18	314	18	33
300	166	818	738	1	42	—	—	14	—	7	350	21	18
712	2,505	12,886	6,283	—	—	—	—	96	21	78	1,421	74	100
952	1,164	11,093	5,203	—	—	—	—	56	20	85	1,091	79	78
474	3,457	3,214	1,951	1	806	—	—	122	114	88	2,650	105	199
,275	1,927	8,043	5,849	4	226	—	—	50	28	62	1,007	55	41
,204	56,743	175,258	122,042	23	3,217	2	175	1,821	1,077	1,420	31,255	1,392	2,435

B. FRENCH SOMALILAND.

(a) Geographical Survey.

French Somaliland is situated in the east coast of Africa, facing the Straits of Bab-el-Mandeb. It is bounded on the north by the Ras Dumeirah, on the south by the Wells of Haadu and British Somaliland, and on the west by Abyssinia.

It is a strip of parched and arid sand, terminating 90 kilometres inland in broken country adjoining the Harar mountains. It covers an area of 36,000 square kilometres.

(b) Climate.

The climate is very hot and dry without being unhealthy. Thanks to the railway, Harrar, whose high altitude entitles it to rank as a climatic station, can be reached in eight hours from Djibouti.

(c) Population.

The European population numbers 500 and the natives approximately 15,000, belonging to two distinct races, the red African race (Danakils or Somalis) and the Ethiopian white race (Gallas).

(d) Economic Survey.

The agricultural resources of the Somali coast are very limited (date and coconut palms). The geographical situation of Djibouti, at the entrance of the Red Sea, tends to make of it a great commercial depôt and the natural outlet for Southern Abyssinia.

(e) Medical and Public Health Personnel.

The Medical Service is carried on by two unattached Medical Officers of the Colonial Army, one of whom is Chief of the Health Service, Director of Public Health and Medical Superintendent of the hospital.

The other is responsible for the medical inspection of ships, etc., for the medical relief of the natives, for general practice, and for the campaign against mosquito larvæ.

These two doctors are assisted by two European N.C.O.'s in the Army Medical Service, one European nurse (a nun), and seventeen native civil hospital assistants.

This staff is employed at the hospital, at the dispensary, in the destruction of larvæ, and the medical inspection of ships.

(*f*) Public Institutions.

There are at Djibouti :—

(1) An inter-colonial hospital, constructed at the expense of the local administration, with the help of a subsidy of 50,000 francs granted by Indo-China and Madagascar.

(2) A dispensary, at which the consultations are very well attended.

There is no vaccine-producing centre. Each winter the colony receives from France dry vaccine, which keeps perfectly and has proved itself to be quite effective.

3,000 vaccinations were carried out in 1923.

(*g*) Principal Diseases affecting the Natives.

1. *Tuberculosis.* — Tuberculosis occurs with a frequency which gives ground for some anxiety as to the future of the population. It is due, above all, to under-feeding, to the climate and to the effect of acquired or hereditary syphilis.

Infection is affected by several factors, one of which is overcrowding, at least in so far as the sedentary population of Djibouti is concerned.

Other causes are unhygienic habits, the use of the same dishes or of the same pipe by several people, etc., and particularly the obligation, on pain of being considered an unnatural relative or a false friend, of taking in the hand the sputum from the patient's very mouth, a deplorable custom which will be most difficult to eradicate.

2. *Venereal diseases.* — They are very prevalent, particularly gonorrhœa and syphilis. Soft chancre appears to be much more rare.

3. *Trachoma* is very frequent among the natives, who are very refractory to the long, minute and irksome treatment which this disease requires.

4. *Phagedenic Ulcers.* — The most numerous clientèle of the dispensary undoubtedly consists of patients suffering from this affection.

5. Lastly, a disease to be noted is *fungus-foot* (with yellow and black granulation) which has been carefully studied at Djibouti by successive doctors of the Colonial Army.

(*h*) Still-births and Infant Mortality.

Observation seems to show that still-births and infant mortality are very high, although, in the absence of a civil register, exact figures cannot be given.

This is due to numerous causes, among which are the under-nourishment of mothers, the defective feeding of infants, and constitutional weakness, due to tuberculosis or syphilis of the forebears.

Among the causes of sterility, mention should also be made of affections of the uterine cavity, due to gonococci.

(i) Hospital Statistics for 1923.

		Days treatment
(1) Admissions to hospital :—		
Europeans (the majority landed from ships)	47	1,128
Natives	95	3,045
(2) Admissions to the dispensary :—		
Natives	94	
(3) Number of consultations		15,260
In 1924 : admissions to hospital		300
consultations		10,000

(j) Maritime Health Police.

Directorate of Health :	Djibouti	Chief of the Health Service of the Colony.
Health Area :	Djibouti Resident doctor of the hospital.—Public Health Officer.	Isolation hospital at Mascali equipped with a Clayton apparatus in bad condition. A new Clayton apparatus with petrol motor and mounted on a trolly will shortly be sent out.

In addition, a sanitary detachment is engaged in the destruction of larvæ in the town of Djibouti and its immediate vicinity. Relations have been established with the health administration of the neighbouring countries.

(k) Sanitary Engineering.

Local regulations lay down the conditions to be complied with as regards building and the health conditions of the town and all other agglomerations.

(l) Budgetary Credits (1924).

Sums appropriated for the health and medical services :—

Local budget	Personnel	Material	Total	%
5,015,700	152,075	126,430	278,505	5.55

C. FRENCH SETTLEMENTS IN INDIA.

(*a*) Geographical Survey.

The French possessions in India consist to-day of five different territories separated from each other and covering a total area of 50,803 hectares. They are as follows :—

(1) On the Coromandel Coast : Pondicherry and its territory : Karikal with the surrounding villages.

(2) On the Orissa Coast : Yanaon and its territory.

(3) On the Malabar Coast : Mahé and its territory.

(4) In Bengal : Chandernagore on the main channel of the Hoogli.

These settlements also include a certain number of " lodges " ; that of Masulipatam on the Orissa Coast, of Calicut on the Malabar Coast, those of Kassim-bazar, Janydia, Fakka, Balassor and Patna in Bengal, and the " factory " at Surat.

The administrative centre of these settlements is Pondicherry, part of which, extending along the beach and known as the White Town, with its well-constructed buildings, is a delightful resort full of seductive oriental charm.

The colony is placed under the authority of a Governor ; it has a General Council which sits at Pondicherry and is represented in Parliament by one deputy and one senator.

(*b*) Climate.

The climate of Pondicherry is generally healthy ; during the dry season, from November to February, the temperature varies from 31.9° to 20°. During the hot season the extreme temperatures are respectively 36.8° and 25.2°. This is the period of the south-west monsoon and of dry and parching land winds which raise a fine dust that stings and scorches. The climate of Karikal is very similar to that of Pondicherry. Rains are rare ; the average rainfall of eleven years was 1 m. 214.

At Chandernagore, the temperature is very variable. While in January it is sometimes as low as 8° or 7°, in May it reaches 43°. The rainfall is abundant, beginning in March and April and lasting until the middle of October.

The climate of Mahé is very healthy. The average temperature of the year is 24° to 25° ; torrential rains occur regularly in June, July and August.

At Yanaon the temperature varies between 20° to 26° from November to January, between 27° and 36° from February to April, between 36° and 42° from May to June and between 28° and 34° from July to October. The

rainy season begins towards June 20th and ends in the first days of November.

(c) Population.

The total population is approximately 269,000 inhabitants. The great majority are Brahmin Hindoos divided into four main castes, the two lowest of which are each subdivided into an infinite number of secondary castes usually corresponding to different professions.

The Moslem religion has made numerous converts amongst the Indians. This diversity of religions frequently leads to disputes and even to riots.

There are also a number of half-castes, known as " Topas ", descended for the most part from alliances with the Portuguese. Europeans are very few.

A large number of languages are spoken in the different parts of the colony. At Chandernagore, Hindustani or Bengali is spoken by the people, Tamil is used at Pondicherry and Karikal, Maleolum is spoken at Mahé, and Telagu is the language used on the Orissa Coast (Yanaon).

(d) Economic Survey.

Rice is the most important of the crops and the ouput is consumed locally. At Pondicherry and Karikal groundnuts are grown ; they are stripped of their husks on the spot and then nearly all shipped to Marseilles. Spices (pepper and nutmeg) are important sources of revenue for Mahé.

Nearly all the industry is centred at Pondicherry, which has won considerable renown for the manufacture of the so-called " guinea " cloth. Several large textile factories, equipped with modern plant, are established in the neighbourhood.

The general trade figures average 50 million francs annually.

(e) Health Organisation.

The Health Service is directed by a Senior Medical Officer (first class) of the Colonial Army, who has under his orders at Pondicherry a senior assistant medical officer and a senior chemist.

At Karikal the Health Service is entrusted to a civilian doctor placed under the orders of the Director. In the other settlements and in the villages of the territories of Pondicherry and Karikal, medical assistance is given to the population by native health officers from the Pondicherry School of Medicine.

The Native Medical Relief Service is very well organised and might give excellent results if it was not often hampered by the grossest superstitions, encouraged by the sorcerers and quacks who for centuries have exploited the credulity and ignorance of the population. The health officers, with the

assistance of the vaccinators and midwives, generally do their best to combat these traditional practices and to inculcate the elementary principles of hygiene in the natives ; but their efforts are rarely crowned with success.

(*f*) Health Institutions.

The hospitals open for European and native patients number four, there being a hospital in each of the towns of Pondicherry, Karikal, Mahé and Chandernagore.

To each of these hospitals is attached a maternity ward and a free consultation service, with distribution of medicine.

(*g*) Scientific Institutes.

One Native School of Medicine.

(*h*) Hospital Statistics.

In 1922 the number of patients treated in the various hospitals of the colony was 2,365, who received altogether 43,380 days' treatment. The total number of consultations was 133,517.

(*i*) Endemic and Endemo-epidemic Diseases.

1. *Malaria* is the most widespread of the endemic diseases : it is not prevalent, however, to the same degree in all the settlements. Chandernagore is most seriously affected, next comes Pondicherry, then Yanaon, Karikal and Mahé. In Chandernagore there are over 1,500 large and small ponds in the different quarters of the town. All these pieces of water, which never dry up, are full of mosquito larvæ. Sufferers from malaria nearly all have spleens of surprising dimensions. This affection, known as *basse* throughout Bengal, very often ends in cachexia. It is very probable that, among the patients suffering from " basse ", are a number of cases of " kala-azar " which have hitherto escaped the observation of the native doctors.

2. *Cholera* principally attacks the native population of which it takes greater or less toll according to the violence of the epidemics. It frequently attacks the Topas but very rarely the whites—an unquestionable proof of the value of hygiene, whose most elementary rules the unhappy natives ignore ; their dwellings are unclean, their food inadequate, and the water of the wells or tanks which they are obliged to drink in the country is frequently foul. In the single settlement of Pondicherry during a period of twelve years, cholera claimed 6,522 victims.

3. *Plague.* Until 1905 Chandernagore, although in the middle of an epidemic centre of plague, had remained immune, or rather, only isolated

cases had occurred since 1897. In 1905 the disease assumed the dimensions of an epidemic and 226 cases of plague occurred, 172 of which were fatal. Since this violent outbreak, plague has continued to be prevalent, either in the form of small epidemics quickly stamped out by strict prophylactic measures or in the form of sporadic cases. It must not be forgotten that the town of Chandernagore is close to the very populous town of Chinsura situated in British territory and frequently visited by epidemics of plague, which is endemic in this part of Bengal.

All our other settlements have hitherto remained immune.

4. *Smallpox* is responsible for about 250 to 300 deaths every year.

5. *Infectious conjunctivitis* is very prevalent among children during the hot months. This disease is propagated by a small fly of the simulides type which deposits the germ on the eyelids.

6. *Yaws* only occur among the Indians ; this disease is sometimes epidemic in certain villages and children are particularly liable to it.

7. *Elephantiasis* is fairly widespread and assumes monstrous proportions among the Topas, but particularly among the Indians. Both legs are rarely affected at the same time. It is more common among men than among women and rarely attacks the upper extremities.

(*j*) Sporadic Diseases.

1. *Tuberculosis* is comparatively rare, which is the more surprising as a large number of factors tend to preserve and spread infectious germs among the native population. Apart from the lungs, the meninges and peritoneum appear to be most frequently affected. The cutaneous tissue and the bones and ganglionic system are, however, also sometimes attacked.

2. Cases of *atrophic cirrhosis of the liver* with ascites are not rare among the lower classes, who indulge to excess in arrack whisky. Among the upper classes, the drinking of liqueurs, brandy and whisky is becoming more and more prevalent despite the express terms of the laws of Manu.

3. *Venereal diseases* are frequently observed at the free consultations. The most widespread is undoubtedly syphilis, to which the natives attach no importance ; it often occurs in severe forms. For a long time past mercury has been in use among the natives in treating this disease.

4. *Scabies* is extremely prevalent even among Hindus of high caste, who disregard the most elementary rules of hygiene.

5. Lastly, mention should be made of *bites from poisonous snakes (Naja tripudians)* which cause a considerable number of deaths every year ; the natives rarely consent to injections of Calmette's anti-toxic sera.

(*k*) Leper-Hospitals.

At Pondicherry there is a leper-hospital which was first established in

1826. This hospital, the upkeep of which is provided for out of local revenue, is situated close to the town. A health officer visits the inmates daily.

The number of patients treated at the hospital is somewhat variable but it rarely exceeds sixty. The number of lepers known to be living at Pondicherry is estimated at about 300. In the other settlements leprosy is also prevalent, although it is rare in the Chandernagore territory.

D. REUNION.

(*a*) Geographical Survey.

The island of Reunion, one of the Mascarenhas group, lies between 52° 55′ and 53° 12′ E. long. and between 20° 50′ and 21° 20′ S. lat. In shape the island is elliptic, 71 kilometres in length and 51 in breadth ; its area is 260,000 hectares.

It is of volcanic origin and is divided into two distinct mountain ranges joined by a vast plateau named the Kaffir Plain, 1,600 metres above sea level. The western and higher massif culminates in the Piton des Neiges (3,069 metres). The eastern massif, which is the more rugged, contains an active volcano named the Grand-Brule, whose highest crater is the Piton Bory (2,625 metres). Abundant rain falls on these high ranges, and flows down to the sea through deep ravines. Some of these watercourses never dry up, but they are never navigable.

A coastal railway, 126 kilometres in length, connects St. Benoit to St. Pierre by way of St. Denis. A port accessible to large trading vessels has been constructed at the Pointe-des-Galets. The administrative centre is St. Denis, a town of some 30,000 inhabitants, whose gardens are decked with all the marvels of tropical vegetation.

(*b*) Climate.

The year may be divided into two seasons ; the winter season from November to April, which is characterised by heat, cyclones and heavy rains ; and the fine or dry season from May to October, during which the south-east wind prevails. The average temperature at St.Denis is 25°, and the thermometer varies between 19° and 24° on the Kaffir Plain. When snow falls on the high mountains, the plain is covered with frost. At St. Denis the annual rainfall averages 1,246 millimetres ; it is as much as 4,124 millimetres at St. Benoit. Terrible cyclones often sweep over the region of Reunion and Madagascar.

(*c*) Population.

Reunion has a population of 173,000 inhabitants including Europeans

Indians, Malagassis, Kaffirs, Chinese, and even a few Arabs. To-day, owing to inter-marriages, it is no longer possible to determine the true proportion of whites to natives ; but there still exist a few descendants of the first colonists, who are known as " Little Creoles " ; at various points of the island, particularly in the uplands, they constitute a separate race, which is remarkably beautiful and hardy, and makes a living by agriculture on a small scale.

Reunion is no longer the Eden of the early navigators. The population, passing suddenly from opulence to poverty, restricted to a very inadequate food ration, confined to unhealthy dwellings, and indulging increasingly in alcohol, offers very little resistance to the ravages of disease.

In 1923, out of 2,463 young men examined by the military board, 1,910 were pronounced unfit for military service either permanently or temporarily. In 1923, 465 births and 379 deaths were registered : an increase of 86.

(*d*) Economic Survey.

Reunion is an essentially agricultural colony. Agriculture has passed through three different phases, *i.e.*, the cultivation of coffee in the 18th century, and of the sugar-cane in the 19th ; the third phase, that of vanilla and aromatic plants (geranium, vetiver, ylang-ylang) was only inaugurated some forty years ago.

Sugar-cane is cultivated particularly in the Leeward district. Only the shortage of labour prevents the extension of its cultivation to other districts. At present it only occupies about half the total area of the island.

The cultivation of foodstuffs (rice, maize, manioc) is not sufficient for the needs of the population ; Madagascar supplies it with rice and beef.

The alcohol manufactured in the island unfortunately plays far too large a part in the daily diet of the inhabitants.

In 1916, the trade of the colony amounted to 56,571,674 francs.

(*e*) Health Organisation.

The Directorate of the Health Service and of Hygiene is under a Senior Medical Officer of the Colonial Army, residing at the chief town ; he is assisted by a Colonial Board of Hygiene and a Health Board.

The island possesses 22 doctors, 23 chemists and seven midwives.

(*f*) Health Institutions.

At St. Denis there is a colonial hospital, a maternity hospital, a leper-hospital, and an institute of hygiene and micro-biology.

At St. Paul, there is a lunatic asylum, a maternity home and a vaccine service.

The sums appropriated in the local budget in 1923 for the upkeep of these establishments amounted to 540,386 francs, divided as follows :—

Colonial hospital	337,738 francs.
Maternity homes	111,140 francs.
Leper-hospital	54,057 francs.
Institute of Hygiene	37,481 francs.

(*g*) Endemic Diseases.

1. The chief is *malaria*, which is the principal endemic disease of the island in all months of the year and affecting all ages. Although a late comer to the island, malaria accounts for one-third of the total death rate.

The six months during which mortality from malaria is highest are those from January to June, whereas the greatest rainfall is from November to May ; malaria in this island therefore does not seem to follow the law generally observed in the tropics, that malaria is at its worst at the beginning towards the end of the rainy season. But this anomaly is explained by the topography of the island, which contains practically no real marshes of stagnant water ; the rainfall is not continuous during the winter season, but comes in a succession of storms separated by periods of exceptionally intense sunshine. The maximum mortality from malaria coincides with the maximum of combined heat and moisture, thus confirming the law referred to above. This period also provides the conditions most favourable to the breeding of mosquitoes.

Malaria in Reunion does not generally take violent forms except in some of the Leeward districts, in which its severity renders it as formidable as in any tropical country. The average mortality from malaria amounts to 30 per cent of the total mortality ; infant mortality between 0 and 15 years accounts for 33 per cent. The chronic forms are those most frequently encountered, and it can be said without exaggeration that everyone in the island is more or less infected with malaria.

Only the inhabitants of the high plateaux and of the distant upland valleys appear to escape from the attacks of malaria, and even so, the anopheles which carries the disease is gradually rising to greater altitudes, daily infecting localities in which from time immemorial endemic malaria had been unknown.

In certain districts such as that of St. Joseph, malaria patients are to be found whose abdomens are distended by enormous spleens extending as far as the pubis.

Pernicious attacks and cases of hæmoglobinuric gall fever, although rare, are not unknown ; in three consecutive years, 48, 53 and 25 pernicious attacks, and 40, 16 and 8 cases of hæmoglobinuria were observed

It should be mentioned that until lately the prophylaxis of malaria was completely neglected by the inhabitants [1].

2. *Beri-beri* has occurred on several occasions in epidemic form, even attacking the white Creoles. In 1901, in the district of Ste.-Suzanne alone, it occasioned 498 deaths.

3. The various forms of *filariosis :* chyluria, hematochyluria and elephantiasis are extremely frequent, particularly among the half-breeds.

4. As in all our other colonies, *intestinal parasites* are very widespread, and their presence in young children sometimes even causes death.

5. In Reunion, *tetanus* takes heavy toll of infants, on whom it is particularly severe, without sparing persons of other ages. On an average it accounts for one-fifteenth of the deaths among infants up to two years of age. The neglect of the rules of cleanliness is the sole factor in the etiology of this disease.

6. *Diarrhœa* and *dysentery* formerly occasioned very numerous deaths both among the whites and the blacks. These two diseases have become much rarer ; nevertheless, every year, at the beginning of the cool season, cases become more frequent, particularly in the Leeward district in which 96 deaths out of 132 were due to this disease in one year.

7. The annual average of cases of *suppurating hepatitis* is approximately 25.

8. *Venereal diseases* and *tuberculosis* are very prevalent. At St. Denis, the average annual mortality from tuberculosis is given at 23.94 per 10,000 inhabitants.

(*h*) Leper-Hospitals.

A leper-hospital was founded in Reunion in 1852 ; it is situated 14 kilometres from St. Denis, in the centre of a large plateau at 400 metres above sea level (La Montagne). The average number of patients is 50 ; there are usually fewer women than men.

Leprosy exists all over the colony, but the most infected districts are those of St. Leu, St. Gilles and St. Louis ; the Indians and the negroes from the coast of Africa are the most frequent sufferers, but the Creoles are not exempt.

During 1922, several patients were treated with the ethylic ethers of Chaulmoogra oil. After 15 months' treatment, the condition of a woman, whose first symptoms had shown themselves two years previously had so much improved that all the pathological symptoms had completely disappeared. In the case of four other lepers, the softened nodules were reduced and the skin resumed its normal colouring on the level of the erythematous spots.

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[1] A mission under Dr. Arlo, of the Pasteur Institute, has recently been sent to Reunion to organise an anti-malaria campaign.

(*i*) Sanatoria.

Since malaria made its appearance on the coast, Reunion has lost its former reputation for healthiness. Nevertheless, from the coast up to altitudes of 800 to 1,000 metres, there are mountain resorts where persons exhausted by a long stay on the coast can go to recover their health.

The Plaine des Palmistes, on which is built the village of Ste.-Agathe, is situated at an altitude of 974 metres and has an average temperature of 16.2°, with a minimum of 2°.

Salazie, at a height of 872 metres, has an average temperature of 21.01° during the rainy season ; the thermometer remains in the neighbourhood of 15.7° during the winter.

The resort of Cilaos is considerably higher (1,114 metres) ; the average temperature in the rainy season is 18°, and during the winter 12.6°.

(*j*) Maritime Health Police.

The Director of the Health Service is responsible for the Maritime Health Police.

In the Points-des-Galets Harbour, it is carried out by a Senior Medical Officer of the Health Service.

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Special Investigations:

Interim Report on Tuberculosis and Sleeping-Sickness in Equatorial Africa, by Andrew Balfour, C.B., C.M.G., M.D.; E. van Campenhout, M.D., Professor Gustave Martin, and A. G. Bagshawe, M.D., being the expert Committee appointed by the Health Committee, League of Nations, in 1922. (C. 8. M. 6. 1924. III.).	4/–	$1.–
Further Report on Tuberculosis and Sleeping-Sickness in Equatorial Africa, by the same. (C.H. 281.)	2/–	$0.5[illegible]

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PREFACE.

The material contained in "Health Organisation in Denmark" published in 1924 still holds good in the main for 1926.

The present Supplement contains, besides two new papers, various corrections and additions to the 1924 edition, especially new data supplementing the statistical material.

The papers: Friis: "The Supervision of the Sale of Milk in Copenhagen", page 168, and Ollgaard: "The Rigshospital", page 319, in the 1924 edition, appear in the present Supplement in a revised form.

As mentioned in the preparatory note to the 1924 edition, certain changes took place in the spring of 1924 respecting the supervision by the various Government departments of matters pertaining to public health. Other changes have since taken place and it is possible that further alterations may occur from time to time. In this respect no corrections of the 1924 edition have been prepared, as the Public Health Service itself remains practically unchanged. It will, however, appear from the subjoined list by which of the different matters of the various Ministries are dealt with during 1926.

The health affairs in Denmark are supervised by the various Government Departments as follows:

The Ministry for Home Affairs:

Public Health in general, including the National Board of Health;
Medical officers;
Doctors;
Dentists;
Midwives;
Pharmaceutical chemists;
Sanitary regulations;
Housing;
Control of epidemics (the Epidemic Acts);
Approval of by-laws, regulations, etc., of the local authorities regarding health service, hospitals, etc.

The Ministry of Justice:

Quarantine;
Cremation;
The Inquest Acts;
The activity of the Medico-Legal Council;
Post-mortem examination and legal autopsy;
Safeguarding against violent lunatics and mentally deficient;
The law to counteract prostitution and venereal contagion;

Matters connected with the International Opium Convention;
Medical service on the Faroe Islands;
Inspection of food;
Regulations concerning the sale of milk and cream;
Licences for motor-car drivers (dispensations from the regulations).

The Ministry of Social Affairs:

Care of lunatics;
The State Mental Hospitals;
The State Lying-in Hospital in Jutland;
The State Hospital at Sonderborg;
Public aid for treatment of tuberculous persons;
Tuberculosis hospitals and sanatoria;
Finsen's Phototherapeutic Hospital;
Supervision of foster-children;
Accident insurance;
Regulations concerning prevention of accidents;
Invalidity insurance;
Military invalidity pensions;
Approved sick-benefit clubs;
Care of the mentally deficient, the deaf-mutes, the blind and the crippled;
Child welfare;
Children's homes;
Hygiene of factories and workshops.

The Ministry of Public Works:

Sanitary conditions concerning railways and air service.

The Ministry of Education:

The State Hospital, Rigshospital;
Training of physicians;
Training of pharmaceutical chemists;
Training of dentists;
Training of midwives;
School hygiene.

The Ministry of Agriculture;

Agricultural products;
Veterinary affairs;
Dairies;
Slaughter-houses;
Inland meat control;
Regulations for the sale of milk, cream, butter, margarine, etc., as far as imp
tation and exportation are concerned.

The Ministry for Churches and Ecclesiastical Affairs:

Cemeteries;
Burial regulations.

THE MEDICAL PRACTITIONER IN DENMARK

By Dr. Einar Grandjean,

Secretary of the National Board of Health.

In order to acquire the right to practise medicine in Denmark it is necessary pass the final medical examination at the Copenhagen University. Foreigners ay only obtain this right provided they have passed the Danish examination with nours.

The highly developed social legislation which, during the last thirty to forty ars, has democratised the country, and which owes much of its success to the sight and the loyal co-operation of the medical profession, has placed a large and er-widening influence in the hands of Danish medical men, and it may be that is privileged position has served to maintain a wholesome sense of responsibility the part of the profession as a whole.

A recognition of this may perhaps be found in the fact that it has not been deemed cessary to draw up any specific law respecting the activities of the practising ysician. No such law exists in Denmark. The Danish physician must be guided his activities by what exists in various acts, regulations, etc., and by the instrucons issued by the National Board of Health, to whose authority he is subject. is authority is supported by the Act of April 30th, 1909, for the central adminiration of health affairs.

In their professional capacity, all physicians are subject to the National Board Health, which exercises supervision over the duties devolving upon physicians, ssesses authority to point out mistakes committed, and can enforce the notification diseases by the imposing of fines; moreover, this board is empowered to ke legal proceedings against physicians for more serious contraventions of the gulations.

On the supposition that the activities of a physician may involve danger to s fellow-men, either owing to gross incompetency or by reason of defective menlity consequent upon illness or the excessive use of narcotic drugs, the National ard of Health is empowered in cases of pressing necessity to temporarily deprive m of the right to practise. Such decision, however, must, as soon as possible, be bmitted for the approval of the Home Office. The question as to permanent privál must, at the option of the physician in question, and after he has had an portunity of expressing himself, be submitted either to the Minister for Home ffairs or brought before the law courts. The question as to the physician later covering the right to practise may be submitted to the minister or the courts. ccording to existing legislation, the right of a physician to practise (in contrastinction to what applies to pharmaceutical chemists, dentists and midwives) nnot be withdrawn as a supplementary punishment for an ordinary crime. It ould, however, be added that the draft of a criminal law recently submitted by

the Minister of Justice contains the proposal that the person who, by judgmen the court, has been deprived of his civil rights shall forfeit the right to practis a physician.

As far as the rights of the physician are concerned, it may be mentioned the right to render obstetric aid, in addition to the ordinary activities of a physic is conditional upon the completion of a course of study at the Royal Lyin Hospital (announcement of October 22nd, 1849, Midwives Act, § 1).

By virtue of his medical examination the physician has the right to prac as a dentist, but, if he wishes to describe himself as a dentist, he must, in accorda with § 2 of the Act relating to dentists, have duly passed the dentists' examinat

In accordance with § 13 of the Act relating to pharmaceutical chemists, physician is prohibited from supplying medicines or dressings to patients, but application, the Home Office may allow physicians residing at places where t are no dispensing chemists a certain limited right which applies for fixed, pac and priced quantities from privileged chemists. They all have, however, the r in their practise to carry with them and use medicine bought from Danish chem provided this is necessary for the immediate treatment of patients.

In a few special cases (diabetes) the physician may order on the prescri form a small quantity of spirits, which is exempt from the rather considerable exc For personal use (disinfection) he may demand methylated spirit (hospital sp free of excise. Otherwise he may not prescribe pure (excise exempted) spirit patients, but only spirit to which medicine has been added.

Homœopathic physicians have the same rights as other physicians.

In most cases the physician has the right to demand that his fee be fixed the Courts, which will, as a rule, follow the opinion of experts, due regard b had to the position and circumstances of the patient.

The physician has no special obligation to allow credit with respect to paym of fees, and his claims for the current and preceding years on estates of disea persons and bankrupt estates are privileged claims.

Finally, on establishing himself, the physician must immediately give no to the district medical Officer of Health, and he must likewise notify his remo

The National Board of Health has instructed physicians to submit report follows:

1. *Special reports* on infectious diseases in accordance with the law relating epidemics, and in regard to cases of tuberculosis of the lungs and larynx, child fever, tetanus, trichinosis, etc.; also respecting serious cases of poisoning.

2. *Weekly reports* of all cases of infectious diseases occurring within his pract

3. *Annual report*, which every physician outside Copenhagen must send in the medical officer regarding conditions which, in the opinion of the physician, deserving of mention.

Further, the physician is bound to comply with various instructions regard the drawing-up of prescriptions.

In the event of a physician rendering obstetric aid without the services of a ıidwife, he is bound to comply with all the requirements imposed on the midwife ı accordance with the Act respecting and the instructions issued to midwives. Ie must notify the birth to the vicar of the parish, see to it that due entry is made ı the midwife records and in the form for the insertion of distinguishing marks howing the degree of development of illegitimate children at birth.

By the terms of the Inquest Act, authorised physicians must undertake inquests ı the towns, and in the country within a radius of a mile. About 88 per cent of he inquests undertaken in Denmark are now made by physicians. In the other ases the cause of death is almost always verified by physicians, as the physician ho has last attended the deceased is bound on application to state the cause of eath to the Medical Officer of Health. The physician who has attended the deceased ıust carry out the inquest and issue a death certificate for a fixed fee. If the condiions surrounding a death render it desirable to being the matter to the attention of he authorities, the physician must report to the police. The same applies in the ase of suicide, death by drowning, death by misadventure or when a person or a œtus is found dead.

Otherwise the physician is not bound to notify crimes committed, but only as the ordinary obligation to disclose contemplated crimes (Penal Law, § 109). t is, however, doubtful whether the physician, when he has rendered obstetric aid ithout the services of a midwife, must be considered bound to follow § 13 of the ıstructions to midwives, which requires the midwife to notify the police when sumıoned to a woman who has just given birth without witnesses being present and he child is dead or cannot be found.

Deaths which occur as a consequence of medical treatment — for instance, eaths under the administration of an anæsthetic — are not dealt with as deaths y misadventure and are therefore not notified to the police. But naturally this does ot imply that steps may not be taken against the physician.

As there is no law respecting the responsibility of physicians, the physician, in he exercise of his activities, can only be held liable under the ordinary rules f law.

In this connection, the question mainly concerns the sections of the Penal Law elating to manslaughter and unintentional bodily injury.

It is not the physician's error, as such, in the exercise of his profession, which punishable, and only in so far as it causes death or bodily injury may it under ertain circumstances become so.

The physician is not protected by the expressed desire of the sick person or the anction of the latter in submitting to treatment. For the sick person cannot, as rule, have full knowledge of the nature and extent of the intended operation or f the risks and consequences this may involve, and at times the mental condition f the patient is such that the physician cannot attach any weight to his wishes.

For instance, doubt has been raised as to the justification of the treatment by he physician of psychically degenerate offenders against decency and morals, in he form of sterilising operations. In this connection the Minister of Justice some ime ago refused a prison doctor permission to undertake the castration of an impriıoned habitual offender of this type who had earnestly begged that it be done. A ommission appointed by the Minister of Justice is at present considering the question f measures to be taken against this class of criminals.

The Danish law contains no direct provision establishing the right of the p sician with regard to the infliction of bodily injury in the exercise of his professi but the physician is regarded as occupying an exceptional position, so that he is p mitted, with the sanction of the patient, to take the steps necessary to relieve patient, provided that in the treatment he acts in accordance with the rules of medi science.

Anyone who, owing to lack of due care, causes bodily injury to another per may be ordered to pay, in addition to compensation for medical expenses and l of trade, for the inconvenience caused, resulting defect and disfigurements, as de mined by the court. Likewise, the person who maliciously causes the death another may be required to pay the surviving widow and children compensat for the loss of the breadwinner. Such legal action is rarely brought against phy cians in this country. Recently there was a case of this kind where a patient, a treatment which consisted of a cosmetic paraffin injection in the nose, claimed c pensation for disfigurement. In another case the extraction of a tooth was follov by rather serious complications, for which the physician was held responsible. Th has also been a case arising from the uvula having been removed in a tonsillecto operation. In all three cases the physicians concerned were acquitted. Howe in another case, in which a piece of gauze was not removed after an operation p formed at a hospital, the physician was ordered to pay compensation, and this also the case when a patient at a hospital during the administration of an anæsthe was burned by a hot-water bottle.

With regard to the liability of the physician for *abortus provocatus*, the emerge right which the physician is deemed to have in such cases is conditional upon th being danger to life. In order to free himself of responsibility for criminal aborti which in itself is punishable, he must be able to explain satisfactorily the medi signs of risks to life justifying the operation undertaken, and he must have perform it with the sanction of the patient and by the usual methods.

The physician may not act on the strength of humane considerations, wh he would otherwise consider respecting his patient, and only the presence of act danger to life indications will exempt him from responsibility in the performa of abortions.

At the university the medical students are taught that the physician ou never to perform an *abortus provocatus* alone, but must always consult first w one or several of his colleagues. The emphasising of this rule by the teachers the university aims partly at preventing premature attempts, partly at exempt the physician from unjustified suspicion with respect to his motives. The rule generally recognised and practised.

Strictly speaking, from the viewpoint of the law, the physician has no spe obligation beyond the duty of a citizen to render assistance, as established in Penal Law, towards persons who are in danger of losing their lives. This is, howev apart from the duty of holding inquests and issuing death certificates in accorda with the Inquest Act, and also the duty which, perhaps ever since 1672, devolved upon the physician to render assistance to the poor and needy, which du nowadays at all events, plays no practical part. Naturally the profession recogni that the physician has a moral obligation to render assistance in cases of sudd or suddenly aggravated illness. For this reason, the medical corporations h in most towns organised regular medical watches on Sundays, which in Copenha are arranged together with the Red Cross Society.

Moreover, the physician, on passing his examination at the university, admits moral obligations in the following terms:

"After having given a public demonstration of my knowledge in medical and surgical subjects, I hereby promise — for the fulfilment whereof I have further given my hand to the principals of the academy — that in my work as a practising physician I shall always bear in mind as being of the greatest importance to apply my knowledge, to the best of my ability, with diligence and care, to the benefit of the community and my fellow-men; that I will be equally conscientious in my care of the poor and rich without regard to person; that I will not unwarrantedly divulge what I may hear in my capacity as physician; that I will endeavour to extend my knowledge, and in other respects to acquaint myself and closely comply with the orders and regulations concerning me and my profession."

The physician is not, as such, exempt from the ordinary duties of citizen and st also appear as witness when required. A physician who has no assistant is mpt from jury duty.

As a witness the physician may not urge his privilege of silence. The obligation o silence which he has undertaken by his promise given when he became a physi- only covers that he shall not "unwarrantedly" divulge what has been confided im in his capacity as a physician, and this obligation must give way to the general gation to bear witness. Neither may a chief physician, when called upon by court to do so, refuse to furnish abstracts from the hospital journals or state contents of same (judgment given in Supreme Court, November 6th, 1903). private practising physician cannot claim any qualified credibility. For instance, ertificate issued by him has no greater validity in legal matters than ordinary lence not confirmed by oath, and cannot be regarded as full proof in litigation ts correctness be contested.

Medical certificates used in lawsuits may be submitted for the approval of the lico-Legal Council.

With regard to the compulsory removal of mentally deranged, the rule holds t this can be effected through the police on the basis of a medical declaration over four weeks old, which shall state when the examination took place and cribe the patient in question as being mentally deranged and dangerous to himself his surroundings. Moreover, a certificate is required from a registered medical ctitioner in accordance with various Acts (the Act relating to civil service em-yees, the Invalidity Act, Workmen's Insurance Act, the Marriage Law, Apprentice . School Act, Motor Act, Tuberculosis Act). For some few of these certificates a ain fee is fixed by laws. It is chiefly through the numerous certificates of this d that the physician comes into contact with the authorities, and it is by the eful and conscientious drawing-up of these that he renders himself deserving of special confidence he enjoys. In this respect he is subject to § 155 of the Penal v, which fixes punishment for the giving of false declarations in writing for lic purposes.

In addition to the above-mentioned obligations toward the authorities and the ividual citizen, the physician has finally, through the collegiate rules of the General nish Society of Physicians — which, practically speaking, includes all Danish

physicians — a large number of obligations to his fellow practitioners, obedie to which is enforced by the collegiate arbitration courts, whose aim it is to cr the necessary respect and reputation for the holders of medical licences.

The General Danish Society of Physicians, whose official weekly organ, *U skrift for Læger*, consists of a scientific and of a professional section, each with special editor, exercises through the almost complete support of all Danish physici a quite special and remarkable influence on society and the individual physic Exclusion from the Society of Physicians is felt rather severely by the physi financially, because the sick-benefit clubs, which represent by far the greater of the population, have by contract engaged that their members shall only rec medical assistance from physicians which are members of the Society of Physici

The physician must not, by means of fraud, unseemly advertisement or o unworthy methods, endeavour to secure clients.

Periodical journeys in a professional capacity are as a rule not allowed.

Advertisements outside the medical Press must only occupy the width of column and must not be specially prominent. Advertising in pamphlets, programm placards and in chemist shops, kiosks or the like is prohibited.

Periodical and standing advertisements and the sending out of circulars brochures is prohibited. Advertising is only permitted to a limited extent on est lishment, removal and when travelling out of town, and must only contain w is absolutely necessary with regard to name, residence, consultation hours and ciality.

A member may not, by written testimonials outside the medical Press, contrib to the support and promote the sale of secret remedies and dietetic products and like.

Members must not be attached to any institution or clinic which is mana by a masseur or physical culturist who is not authorised by the Society of Ph cians.

The collegiate arbitration courts likewise see to it that physicians do not, their authorisation, protect persons or circumstances which otherwise would c under the law relating to quacks.

No physician may advertise as a specialist without having been recognise such by the Society of Physicians. Nor can a claim be made for recognition specialist in a field which is not recognised as a speciality by the Society of Physici

In all specialities the first condition for obtaining recognition is that the p sician in question has had one year's hospital service.

Moreover, in addition to the more special training, an extensive general trai is required, followed by a fixed appointment in a position within the specia concerned (as a rule, three years).

Every specialist has the same right as an ordinary practising physician to c on an ordinary practice, but an ordinary sick-club practice and municipal prac cannot be carried on by the specialist without the permission of the Society Physicians.

Certain physicians occupy an intermediate position between the Medical Offi of Health and the practising physicians by reason of their special training — instance, head physicians at mental hospitals. They are specially empowered the authorities when required to give declarations regarding the mental condi

people in connection with the contract of marriage and in matters pertaining to
arriages.

A description of the legal rules, etc., which indicate the privileges and obligations the Danish physician can only be of slight assistance in throwing light on the ethical ndard to which he has attained, as it presents only the minimum, which obviously nnot and should not be the norm for the physician who realises his obligations his profession and who has to utilise his special knowledge and abilities under dely different conditions. This description would be incomplete without reference the medico-ethical training which the prospective physician obtains at the Copen-gen University under a thoroughly personal and intimate co-operation — from e commencement of his seven-year period of study — with the specially selected chers and leaders, with professors and docents at the hospitals and clinics.

PHYSICIANS AND THE MOTOR LAW.

I.

CERTIFICATES OF PHYSICAL FITNESS.

By Dr. Einar GRANDJEAN,

Secretary of the National Board of Health.

The Act of March 20th, 1918 (*confer* Act of May 6th, 1921, relating to mo vehicles, etc.), makes it a condition that, before issuing a licence entitling a per to drive motor vehicles, the police authorities shall be satisfied as to the applica being in possession of full seeing and hearing powers, besides the requisite in lectual and physical fitness.

Before issuing a driving licence the police authorities will require that applicants shall furnish a medical certificate stating that the conditions mentio in the statutory provision quoted above are present.

The decision as to whether the conditions required are present or not rests w the police and not with the physician, whose certificate will accordingly be conside as merely informatory for the police authorities.

For the guidance of the physicians, the National Board of Health has, in circular of January 1st, 1919, given the following statement:

"The seeing power may be characterised as sufficient when the eyesig when subjected to a test without glasses, or with the glasses usually worn the applicant, is at least 6/12 on one eye, and at least 6/24 on the other e and when the field of view, when testing either eye by means of the hand, pro to be of a normal extent. The applicant must further give a declaration the effect that he is not suffering from night-blindness. In cases of doubt applicant shall be referred to an eye-specialist.

"The sense of hearing may be characterised as sufficient when the joint heari power of the two ears reacting on the impressions conveyed by ordinary hum speech is at least 16 metres, and on no ear less than 2 metres.

"In each separate case the state of fitness shall be judged by virtue of conditions prevailing, subject, however, to the requirement that in any ca

(out of regard to steering, application of brakes and signalising) the applicant shall be capable of using both arms and legs, and not knowingly be an epileptic or suffering from fainting fits."

When issuing these certificates the physicians have not always been fully alive he fact that it is not a subjective medical opinion which is required by the police information as to all existing defects and abnormal conditions which may influence decision of the authorities in each special case as to whether a driving licence uld be granted or not.

The National Board of Health has therefore found it expedient, in a circular ed November 26th, 1925, to enforce upon the physicians the necessity of stating he certificate the existence of all such defects or abnormal conditions.

Pursuant to § 17 of the Act, the Minister of Justice is authorised to permit the ing of a special driving licence to persons who do not fulfil the requirements of law as to *physics*.

In these cases of dispensation as well as in most cases of doubt, the National rd of Health will usually be called upon to give its opinion.

The increasing number of cases of such nature has made it desirable for the ional Board of Health to try to some extent to lay down general rules applicable each individual case. Through co-operation between the Ministry of Justice, National Board of Health and experts on motor driving, the following instructive s have been arrived at:

The rules are based on the principle of classifying motor-vehicles under three ups, viz.:

Class A.

Motor-cars on three or four wheels provided with a foot-operated clutch and brake, ides a hand-brake, but with a hand-controlled change-speed gear.

Class B.

Motor-cars on three or four wheels provided with a foot-operated clutch and ke, besides a hand-brake, but not having the change-speed gear operated by id, as the clutch and the change-speed gear are controlled by the same pedal.

Class C.

Motor-cycles on two wheels.

e Lower Limbs.

1. *Club foot* (*Pes varo-equinus*) in a smaller degree will be no hindrance provided t the muscular power is normal. In more severe cases an examination made by

an orthopædic specialist is required, and the permission should be made subjec the condition that the applicant is only allowed to drive a special type of car wl is provided with pedals the pads of which have the necessary size and placed so much apart as to permit of unhampered operation.

2. *Stiff ankle-joint* will be no hindrance provided the muscular power is norı If, however, it is the right ankle-joint which is stiff, the throttle shall be hand-c trolled.

3. *Limp ankle-joint* requires the constant use of a rigid bandage of suffici strength, and the muscular power of the leg shall otherwise be normal.

4. *Amputation of foot* and up to half part of *crus* makes the use ot rigid proth of ample strength indispensable.

Provided that one ot the lower limbs is sound, and the injury of the other c prises only one of the cases mentioned under 1 to 4, permission may be grantec issue a driving licence for Class A as well as Class B but not for Class C. The wei of the motor vehicle, including outfit and full load, must, however, in no case exc 2,000 kilogrammes, and the throttle shall be hand-controlled. The sound leg n furthermore possess normal strength.

5. *Cases of enervation of the muscles* (*paresis*) should be referred to an orthopa specialist for a thorough examination, and definite rules cannot be given.

6. *Stiff knee-joint;* 7. *Stiff hip-joint* when the seat is in a proper conditi and 8. *Lack of a lower limb*, provided that only one limb is defective, will be hindrance for the granting ot a licence to drive motor vehicles ot Class A, not Classes B and C subject, however, to the following requirements be complied with:

(*a*) Clutch and brake shall be operated through one and the same pedal;

(*b*) The operation of same shall not require greater force than 40 kilogram

(*c*) The throttle shall be hand-controlled;

(*d*) The gross load of the car, as mentioned above, shall not exceed 2, kilogrammes.

In connection with the above-mentioned, it is an implied condition that b upper limbs shall be sound and of normal power.

The Upper Limbs.

9. *Defect of fingers.* The grasp shall be firm and the applicant able to h on to a smooth wooden stick of a thickness of 30 millimetres to which is suspen a load of 20 kilogrammes.

10. *Stiff wrist* and 11. *Stiff elbow-joint* must be specially examined and judged each individual case.

12. *The lack of fingers* on one hand is an absolute hindrance.

With regard to sub-sections 9, 10 and 11 is added that, in case the defect is on right hand, the driving licence should preferably be given for motor vehicles of ss B (Ford) where the mechanical manipulations almost exclusively are carried by means of the left hand and where the defective hand in all essentials will a support only for the steering-wheel.

The defects under 9, 10 and 11 exclude motor vehicles of Class C.

In case of defects in one of the upper limbs the gross weight should not exceed 00 kilogrammes, and it is an implied condition that the other upper limb and h lower limbs shall possess full physical fitness and normal power.

It is finally mentioned that, in case of injuries and defects comprised under 1 11, special permission may be granted if the driving licence will only permit of ving the special three-wheeler motor-cars of the cycle-car type.

The above-mentioned dispensations should only be granted to persons who nt to drive private passenger cars or light motor-lorries, but not to applicants o want to drive motor-vehicles intended for the public conveyance of passengers who intend to drive motor-cars which under some form or other shall carry passen-s against payment of a certain fare.

It is further stated that as regards requisite strength the following rules shall ly:

I. When using both lower limbs the applicant shall be capable of exercising a pressure of 35 kilogrammes with each limb when using both at the same time.

II. In case only one of the lower limbs can be used, it shall be possible by means of this to exercise a pressure of 40 kilogrammes for 10 seconds.

III. When rigid prothesis is being used, this shall be capable of withstanding a pressure of 75 kilogrammes without giving way when the pressure is acting on the ball of the foot of the prothesis.

It is likewise a condition that the injured or defective limb, which is provided h prothesis, if it is to be used when driving, shall be capable of lifting itself by own force and of placing itself on a fixed plate of the size of 50 by 70 millimetres hin a time of 0.5 second while the applicant is sitting on a seat of normal height 0 millimetres). The plate is placed 150 millimetres above the floor and 400 milli-tres in front of the forepart of the seat.

The applications should further be accompanied by a medical certificate in ich the examining physician shall state all particulars relating to the nature of invalidity (including the diagnosis in Latin), and whether the defect must be arded as permanent or whether it may be considered as probable that it will nge, in which case the question of fixing a time-limit for the permission, within limits of the law, should be considered.

Monoculous Persons.

The granting of a licence is in this case subject to the following conditions:

(1) That the applicant has been one-eyed for at least six months;

(2) That the other eye is sound and its seeing power at least $^6/_{12}$ without glass

Deafness.

To this case the rule applies that complete deafness is an absolute hindran whereas deafness of one ear only is no hindrance, and that the existing requiremen as to minimum hearing power may be limited considerably.

It is finally provided that, in case of riding ordinary cycles with a detachable engi of a maximum power of 1 horse-power effective, special licences may be grant beyond what is mentioned above which only applies to motor cycles of normal co struction with mechanical or electric motive power.

Dispensations are not granted to lunatics and mentally deficient. In rare cas only are driving licences granted to epileptics, and dispensations are not recor mended unless the applicant has had a free interval of five years.

It is finally stated that the Motor-Car Act will be revised in 1926, which m result in various amendments to the above-mentioned rules.

II.

THE MEDICAL EXAMINATION OF INTOXICATED AUTOMOBILISTS.

By J. Fog,

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Regulations.

The Danish Act relating to motor-driven vehicles, as revised in 1921, introduced a definite prohibition against persons in a state of intoxication driving motor vehicles, fixing at the same time severe penalties for the contravention of this prohibition, and also for driving in a condition which, though not amounting to intoxication, may be described as "the worse for liquor". In addition to considerable fines or imprisonment, the offence of driving in an intoxicated condition invariably involves the deprival of the driving licence for life.

For a country which is not "dry" these regulations must be described as very severe, and several of those convicted under same may be said to have been hit disproportionately hard by the categorical provisions of the Act. For the regular chauffeurs in particular the consequences may be very serious. It should be observed that the incurrence of the penalty is not dependent upon whether the driving in the case in question has caused a collision or other damage, nor even upon its having demonstrably been to the danger of public safety.

The liability to punishment thus arises automatically immediately anyone drives in an intoxicated condition irrespective of the distance travelled and whether an accident has resulted or not.

The Introduction of the Medical Examination.

To begin with, the regulations caused considerable trouble to the police, partly owing to the fact that the degree of the influence of liquor is difficult to determine, and partly because during the legal proceedings the parties charged invariably advanced all sorts of excuses for weakening the material of the prosecuting authorities, which was described as arbitrary and therefore unjust. As a consequence of this, the necessity for a more uniform ruling in the various cases on a broader and more objective basis soon became apparent.

In this connection, the idea arose of turning over these special examinations the medical men, and an application from the Copenhagen police authorities to Medico-Legal Council resulted in the drawing-up of a detailed form of questions this special purpose. In its deliberations the attention of the Council had b directed to the possibility of availing partly of chemical examinations (blood, uri etc.) and partly of psycho-physical tests, but both spheres were rejected as unsuita for th practical purposes required. Finally, it was decided to adopt a numbe the generally used clinical examination methods with which every medical practitio should be acquainted.

The *question form* drawn up by the Medico-Legal Council (see below) was once introduced by the Copenhagen police authorities, and medical examinati were now introduced as a permanent link in all such cases where an automobi was charged with having driven when under the influence of liquor. This refo dates from the summer of 1922, and examinations have since been availed of i constantly increasing degree. The system was promptly adopted as a model by other jurisdictions in the country and is now used all over. Further, it has n been made an order by a circular issued to the chief constables in 1925 by the Minis of Justice.

Medical Certificate.

The wording of the form drawn up by the Medico-Legal Council is as follo

Name, address, occupation and age of the person examined. Place of exami tion and exact time.

1. What is the *appearance* of the person under examination ? — (Dozy, hea eyelids, flaccid features, congestion to face and the conjunctiva of the eyes, p spiration, slobbering, hiccough, vomiting, clothes disarranged, signs of vomiting clothes, etc.)

2. How is his *manner* ? — (Noisy, elated, arrogant, doltish; high spirits, g rulous, unsteady, indolent, etc.)

3. Does he know *where he is* and what time it is ? — (If in the affirmative, to answered by "yes"; otherwise the remarks made to be inserted.)

4. *(a)* How is the *memory* ? — (Particularly with respect to doings during last few hours. Try whether he can imprint on his mind a couple of street addresse

(*b*) *Descriptive power.* — (The person examined to be asked to narrate, for stance, about the accident, or perhaps to describe a picture in an illustrated pa shown him.)

(*c*) *Calculation tests.*

5. How is the *speech* ? — (Thick, snuffling, lisping, stammering, faltering. T person under examination is asked to repeat difficult words, read a small notice fr a newspaper or the like.)

6. How is *the gait*? — (Lurching, shuffling, straddling, or characterised by ata Romberg's test may be tried, turning round and the like.)

7. (*a*) *Steadiness of gestures with the hand.* — (Finger-to-finger test, picking-up f objects from the floor, and the like.)

(*b*) *Handwriting.* — (The party under examination to write his name, age, ccupation and residence.)

8. *Pulse* (regularity, frequency). *Pupils* (size, reaction against light). *Suscepibility to pain* (numbness).

9. Does the party under examination *smell* of liquor ?

10. Are there any signs of *illness* (epilepsy, apoplexy, traumatism, shock, etc.) r great *emotion, weariness,* etc.

11. Other observations (including the remarks of the person charged respecting is consumption of liquor during the last twenty-four hours).

Conclusion.

(*a*) Have symptoms appeared during the examination tending to indicate that he condition of the person examined is not normal ?

(*b*) Must it be assumed that the symptoms displayed are a consequence of the onsumption of alcohol ?

(*c*) Would you describe the condition of the person examined as "intoxicated"?

(*Signature*)..........................

The Examination.

The examination is undertaken in Copenhagen by doctors of the Institute of ledical Jurisprudence, and in the other parts of the country as a rule by the District Medical Officers of Health. It is, however, the intention that any doctor hall be able to undertake such examination.

In Copenhagen it always takes place at the police station to which persons harged are removed. The doctor is sent for immediately by the police, as otherwise he condition of the person to be examined may essentially change character. The octor must be prepared to encounter a certain ill-will on the part of the person nder examination, and likewise he must reckon with the easily aroused ill-humour hich not infrequently manifests itself in a downright contrary or even aggressive ttitude. The doctor should therefore act with due caution and consideration and mphasise — in his capacity as physician — his absolutely neutral standpoint.

It will always be advisable to have a *witness* present — as a rule, one of the police unctionaries, who, however, should preferably be in plain clothes. Experience has hown that the presence of a third party has no disturbing effect on the examination, nd the assistance of the witness may indeed be necessary if the person under exaination in a state of excitement becomes aggressive. Likewise, accusations of rbitrariness on the part of the doctor or other manifestations in the way of experimentally attempted defence are less likely to be advanced when a witness is present.

It is characteristic of the effect of liquor on many people, as is well known, that hey develop an enhanced feeling of their own importance, which often finds expreson in a disinclination to submit to the special tests which the examinations involves.

It is, however, astonishing what the doctor, by quiet and polite deportment, c obtain in the way of willingness and tractability on the part of individuals otherwi contrarily disposed. This is of no small importance, as weight must be attach to all the items in the form being gone through as far as possible, in order to procu as much material as possible for judging and documentation. The examinati will, as a rule, occupy about half an hour, not infrequently somewhat longer b seldom less.

Decision.

As is well known, there is in the long scale of alcohol poisoning, ranging from t slightest and almost imperceptible traces to the downright dead-drunk condition, regular and continuous transition. All the conditions within this scale becor "under the influence of liquor", so that naturally to some extent it must be a matt of opinion as to when the condition comes under the description "intoxication However, there gradually develops a certain practice according to which it m fairly well be said to be established where the dividing line should rightly be place

In judging automobilists we distinguish in this respect between three ma groups, viz., "intoxicated", "slightly under the influence of liquor", and "sober Of course, no sharp division can be drawn between these three categories. O of regard to the strict provisions of the law it will therefore be necessary that t doctor's decision is very carefully considered, and if he is not absolutely certain th the condition of the party under examination should rightly be described as "i toxicated", it will not only be justified but even strictly necessary that he reso to the weaker designation: "slightly under the influence of liquor", and with this category it is of course possible by various graduations to further characteri the condition.

One special difficulty should be pointed out — namely, the seriousness and u pleasantness of the situation, particularly on the background of the charge and t possible preceding accident, which can to a high degree affect the whole *psychi habitus* of the person concerned. As a result he may have become extremely nervou with hands uncertain and quick pulse, and, furthermore, he may be susceptible a rapid revulsion of feelings, etc. This wrong source may very easily give rise unjust interpretation, although the more practised examiners will, as a rule, be su cessful in eliminating same.

On the other hand, one must be on guard with respect to the ability whi many possess of pulling themselves together in the face of the situation, often an astonishing degree. This special form of *dissimulation* frequently occurs especia when dealing with more robust natures or persons who are accustomed to consumi considerable quantities of liquor. The close observer will, however, as a rule, able to demask such temporary state gradually as the protracted and psychica rather exerting examination proceeds. But it must, however, constantly be bor in mind that the form of reaction against alcohol varies enormously individual and, likewise, the degree of intelligence of the person examined and his social standi must be taken into consideration to the extent necessary.

Special justification for these examinations being undertaken precisely doctors in preference to others lies in the necessity of precluding confusion betwe alcohol poisoning and *symptoms of illness* of other kinds. By way of instance m

e stated the points of resemblance between serious cases of "under the influence f liquor" and illnesses such as apoplexy or diabetes coma. Likewise, with respect o collisions, attention should be specially directed to symptoms resulting from a ossible *condition of shock*, with its many different variations.

It should be particularly observed that the mere fact of a person *smelling of iquor* signifies nothing definitely indicative of such person being under the influence f liquor. As is well known, one may for a long time smell strongly of liquor after aking quite a small quantity, and the substantiation of the smell is only of interest vhen the person under examination denies outright having had any liquor.

One is tempted to enlarge upon other items in the form, but it will doubtless uffice to confine the comments to what has been set forward above. It may be aid that the examinations offer may variations of special interest, and naturally re not without certain amusing aspects which lend special characteristics to the cene.

Statistics.

During the three and a-half years which have passed since the introduction of the xamination in Copenhagen — that is, from the summer of 1922 until the expiration of 1925 — I have personally undertaken about 400 of these examinations for the Copenhagen police.

From the first 300 examinations of this material — which, by the way, contain nany interesting details for throwing light upon the clinic for the investigation of the influence of liquor — the following figures may be given:

Sex.

Males	298
Females	2
	300

It should be stated that women, owing to their more unstable nature, offer pecial difficulties in judging. Both the ladies examined were better-class people and were both distinctly under the influence of liquor.

Ages.

Below 20 years	5
Between 20 and 29 years	125
,, 30 and 39 ,,	108
,, 40 and 49 ,,	47
Over 49 years	15
	300

The large number between the ages of 20 and 39 has its natural explanation in the fact that numerically there are by far the largest number of automobilists in this class. The youngest was 18 and the oldest 60 years of age.

To what extent driving under the influence of liquor occurs more frequent during what may be termed "night revel hours" will appear more clearly from t following figures showing the time the examinations have taken place.

Daytime (8 a.m. to 8 p.m.)	107
Night-time (8 p.m. to 8 a.m.) . . .	193
	300

As will be seen, practically twice as many occur at night as during the daytim and as far as the night hours are concerned, it is particularly between midnig and 2 a.m. that most night-time examinations have taken place, viz., 59, whi again means that no less than 20 per cent of the total examinations fall within the two night hours alone (= one-fifth of the examinations falling within this one-twelt of the twenty-four hours).

These figures are very interesting in consideration of the fact that the numb of automobilists is far greater during the daytime than at night, and at the sar time afford instructive documentation of the importance of a vigilant eye bei kept on automobilists.

The decisions given in the 300 examinations were as follows:

Intoxicated	71	= 24 %
Slightly under the influence of liquor	183	= 61 %
Sober	46	= 15 %
	300	

As will be seen, considerably over one-half of the cases examined fall under t intermediate category: "Slightly under the influence of liquor", and only abo one-fourth have been described as "Intoxicated". If the latter actually have driv their cars in this condition and the court has accepted the medical certificate, tl has meant that the parties in question have been permanently deprived of the driving licence. Finally, in 15 per cent of the cases it has not been possible to su stantiate any definite signs of the parties having been under the influence of liqu

The last-named relatively large number of "Sober" cases must be consider on the background of the following conditions: at the Copenhagen police-statio it has gradually become a fixed rule that a medical examination is always und taken even when there is only the very slightest suspicion of the automobilist question being under the influence of liquor. An examination which would oth wise be superfluous can be justified in order to clear a man of an unfounded accu tion advanced against him.

On the other hand, it is also a fixed rule that a medical examination shall undertaken even if the party in question is so obviously intoxicated that all dou is precluded, on the principle that the medical certificate must not be missing any case where charges are raised on this basis.

The parties examined can further be divided as follows:

Drivers by profession	202
Private persons	98
	300

As "drivers by profession" have been included all who, on the occasion in ques-on, have driven a motor vehicle for business purposes, as, for instance, the drivers registered taxi-cabs or other passenger vehicles for hire, and also motor lorries, etc.

It may be pointed out that the number of medical examinations need not coin-de with the cases of driving accidents, injury to persons or damage to material. ese two factors are independent of each other, though naturally they will in many ses correspond.

* * *

The medical examination of intoxicated automobilists must now be said to ve long ago passed the experimental stage, and it has, moreover, on the whole ined unqualified support in circles where it has been the object of discussion.

It is the general conception that it represents an essential supplement to the lice examinations, and the authorities likewise show a decided tendency when judging such cases to attach great weight to the medical examination.

The rater frequent attempts which earlier were made in these special cases at rrying through a defence on a weak basis have become more and more seldom, d likewise the tendency to appeal against the decisions given is decidedly on the crease.

Together with the strict provisions of the law, the medical examination is un-ubtedly a preventive factor of importance and as a whole it represents an appre-able contribution to the promotion of safety in modern traffic life.

THE SUPERVISION OF THE SALE OF MILK IN COPENHAGEN.

By St. Friis,

Chief Sanitary Veterinary Surgeon.

Copenhagen is provided with milk from about 3,400 farms, having an aggreg number of about 54,000 cows. Of these, 20 farms, with about 2,100 cows, sup milk for infants, and 10 farms, with about 1,000 cows, supply Jersey milk.

As far as can be judged, about 280,000 litres of milk, besides cream, buttern and skimmed milk, are sent in to Copenhagen daily. Of this quantity of milk s 13,000 litres are sold as milk for infants and about 3,500 litres as Jersey milk.

The stock of cattle from which the milk comes is mainly in Zealand, but there some in Lolland — Falster and Funen. In the districts of Randers and Aarhus th are farms supplying milk which, after treatment at the local dairy, is imported i Copenhagen as cream for export.

The milk from about 3,100 farms reaches the receivers in Copenhagen either di from the producers or through the local dairies (supplementary milk).

The supplementary milk is forwarded to the receivers in Copenhagen through milk committee of the dairy organisations, or direct from the local dairies accord to private agreement.

In the milk coming direct from the producers is also included the milk which dairy managers in the vicinity of the city themselves bring into the city and sell f their own carts.

One of the large suppliers of milk keeps his own special cows for infa In about half an hour after milking, the milk reaches the bottling department of dairy.

The regulations which apply for the supplying and selling of milk in Copenha are contained in §§ 48-62 inclusive. Various amendments to these regulations be made in the near future.

Regulations concerning Sale of Milk.

§ 48. All milk sold in the city and also the shops in the city where milk whic intended for sale is kept, treated or sold are under the Health Committee, and special provisions which the Committee lays down must be strictly compiled w

ne designation "milk" in these regulations covers cream and buttermilk where the ealth Committee finds that the provisions are applicable.

§ 49. No one can bring milk into Copenhagen for sale in the city, or sell milk Copenhagen, without giving notice to the sanitary police. Removals of shops and e establishment of branches in the city must also be notified in advance.

All pure milk and cream brought into Copenhagen must be from farms whose ock, with regard to stabling, keeping, sanitary conditions, besides all other conditions hich may influence the sound nature of the milk, shall be subjected to veterinary spection in accordance with the general rules laid down by the Health Committee. cases where " skimmed milk " is used for the manufacturing of export cream which sent to or manufactured in Copenhagen, this "skimmed milk" shall be subjected the same rules. The Health Committee may further at its own discretion lay down nilar rules which shall apply to all kinds of skimmed milk and buttermilk.

§ 50. Owners of milk cows in Copenhagen are bound to advise the sanitary olice immediately of cases of contagious diseases, including tuberculosis. In other spects they must strictly observe the regulations drawn up for the keeping of cows the Copenhagen Health Committee and also the provisions of the present regulaons, including, as far as live-stock supplying milk to Copenhagen is concerned, the ovisions contained in § 49, sub-section 2, relating to veterinary inspection.

§ 51. As whole milk, only such milk shall be sold which is not deprived of any its natural elements, to which there have not been added any foreign substances nd the content of fat in which is at least 3.25 per cent. The addition to whole ilk of skimmed or half-skimmed milk excludes such milk from being sold as hole milk, even if such milk, after such addition, should not contain less than 25 per cent of fat.

As skimmed milk shall only be sold milk which is deprived of a greater or lesser art of its natural amount of fat. No foreign substances whatever shall be added to ich milk.

The term "half-skimmed milk" is permitted when the amount of fat contained at least 0.75 per cent.

Under the term "Jersey milk", only milk shall be sold which is drawn from Jersey ows and which contains at least 4.75 per cent natural milk fat.

Cream shall only be sold as:

1. Cream (cream for coffee): Under this designation only the fatty part of the milk shall be sold which has been separated from the latter by skimming and which contains 13 to 14 per cent or 18 to 19 per cent natural milk fat.

2. Export cream: Under this designation only sterilised and homogenised cream shall be sold which contains at least 9 to 10 per cent of natural milk fat ; no foreign substances shall be added to such cream.

3. Whipped cream: Under this designation only cream shall be sold which contains 30 to 32 per cent of natural milk fat.

§ 52. As milk for infants must only be sold milk which, in addition to complying ith the demands in § 51, is immediately after milking cooled down to 8° Celsius or

below, and the content of fat in which is at least 3.25 per cent. The milk must kept in a cold place until it reaches the consumer. Further, the milk sold as m for infants must come exclusively from cows which:

(*a*) Have been tested for at least a year with the tuberculine test with a negat result; and

(*b*) Have been examined not more than fifteen days previously by the veterin surgeons and found to comply with the demands with respect to hea tending and feeding, as prescribed by the Health Committee in the gen rules.

Before commencing the sale of milk for infants every dealer in such milk is bou on demand to inform the Health Committee of the place from which the milk infants sold by him comes, and must, whenever demanded by the sanitary pol show by the production of the veterinary certificate that the conditions requi under (*a*) and (*b*) have been complied with.

If the Health Committee finds the veterinary certificate insufficient, the Co mittee can insist upon the dealer taking further measures so as to ensure that conditions laid down by this paragraph with respect to milk for infants are sa factorily complied with.

Forms for such certificates are obtained on application from the Copenha Police, 3rd Department (Sanitary Police).

Milk for infants must only be sold in properly closed bottles of clear, sligh coloured glass. Decanting must not take place. The bottles must be sterilised carefully cleaned before filling; the bottling date must be clearly indicated on bottle.

§ 53. The sale of pasteurised milk is prohibited unless it is described such.

If pure milk, half-skimmed milk, skimmed milk, cream or buttermilk is described as pasteurised milk, it must, in addition to complying with the dema in § 51, have been heated to at least 85° C. and thereafter have been immediately coo to 10° C. or below, and it must not give colour reaction on the paraphenylendiam test.

No milk or cream intended for sale in Copenhagen may be heated to 85° C more unless it immediately thereafter is cooled to 10° C. or below.

If the pasteurisation does not take place in bottles, the cooling must take pl in a cooling apparatus, and if the milk is not thereby cooled down to 10° C. or bel it must immediately be cooled down to that temperature on ice.

Pasteurised milk must only be sold in containers or bottles on which the paste ising date and the name of the pasteurising firm are clearly indicated.

If the sale takes place in bottles, these must be of clear, only slightly colou glass with airtight stoppers. Such milk must not be decanted.

Containers and bottles must either be sterilised or carefully cleansed be pasteurising.

Milk or cream intended for sale in Copenhagen which has been subjected to a heating process different from that named in sub-section 2 of this section, or which has been subjected to sterilisation, homogenisation, evaporation or the like, must not be offered for sale unless the Health Committee has approved the treatment. Milk or cream which, with the permission of the Health Committee, has been subjected to such treatment must not be offered for sale unless provided with a clear and distinct indication of the treatment in a way approved of by the Health Committee.

Pure milk which has been pasteurised once must not again be subjected to pasteurisation nor heated. Pure milk which has been heated once (see the preceding paragraph) must not again be heated nor pasteurised.

§ 54. Under the description "mixed milk for infants" — regarding which, as far as the milk used for mixing is concerned, the regulations indicated above under milk for infants (§ 52) apply — the milk can be sold in bottles, mixed with boiled water, and with the addition of sugar, provided the exact indication of the constituent parts and the mixture is stated on the label of the bottle.

The bottling date must be clearly indicated on the label.

The mixture must always be sterilised in the bottle itself.

§ 55. Buttermilk, curds, etc., shall be described as such on sale. This also applies to milk from animals other than cows.

Under the designation buttermilk, only such milk shall be sold which is the product from the churning of cream (or milk) which remains in the churn when the butter has been removed from the latter.

Buttermilk shall contain at least 6,175 per cent of milk solids, but when offered for sale in bottles it shall contain at least 8,075 per cent ot milk solids, besides which the bottles shall be corked and labelled as "bottled buttermilk".

§ 56. All milk must be strained through a fine sieve immediately after milking has taken place, and it must in other respects be handled with care and cleanliness. Premises in which the milk is kept or cooled or subjected to any other treatment before being transported to Copenhagen must be clean, light and airy. All objects and utensils with which the milk comes into contact must be kept throughly clean.

§ 57. It is prohibited to sell milk (buttermilk) and cream whose colour, smell, taste or appearance is remarkable; milk from cows which have recently calved, and milk not serviceable for boiling; from cows suffering from clinically demonstrated tuberculosis, anthrax, black leg, hydrophobia, yellows, inflammation of the udder, pyæmia and septicæmia, inflammation of uterus, poisoning, foot-and-mouth disease, variolous disease in advanced stage, bad attack of diarrhœa or ailments attended with fever, and also from cows treated internally or externally with medicaments which affect the milk. Milk containing dirt or other impurities may not be sold.

Milk which, after standing two hours, shows a visible precipitation is regarded as impure.

Milk treated with some preservative or colouring substance may not be sold.

In order to ensure observance of its rules, the Health Committee may, in cas not subject to the provisions laid down in § 49, sub-section 2, at any time ask whe milk sold in Copenhagen comes from, and can demand that the dealer in questi sends in twice monthly to the Committee a veterinary certificate on the state health, the tending, and fodder of the stock of cattle in question, drawn up in accor ance with the general rules of the Health Committee.

§ 58. In the shops where milk is sold, every milk container from which milk the kinds named in § 51 is measured out must be provided with the exact designati of the kind of milk it contains. The designation must be clear and in letters of 25 30 millimetres long and the containers must be placed so that the description is visib to the public.

If milk is sold in bottles these must be of clear, only slightly coloured, glass. T designation of the contents and the name of the firm must be correct, conspicuous a placed on the side of the bottle or on the stopper. The quality of the milk contain must be clearly indicated on the side oı the bottle or on the stopper.

The following regulations apply with regard to milk to be sold in the city:

Other designations of milk than those named in these rules are not allowed containers and bottles or advertisement notices unless the Health Committee in ea case sanctions it.

Regulations regarding the construction of milk containers, treatment and tra port are included in the special regulations drawn up by the Health Committee.

No decanting or tapping-off of milk may take place in roads, streets or other op places, in doorways, courtyards, on stairways, or in similar places.

§ 59. Premises in the city in which milk for sale is kept, treated or sold must aired and carefully cleaned daily.

If the floor consists of boards and is not covered with linoleum or other waterpro material, it must be kept varnished and the openings between the boards filled wi putty. The floor must be cleaned daily with a wet cloth. Once a week the floo doors, panels and windows must be carefully cleaned.

Where walls and ceilings are not of marble or other stone, glass, etc., or a painted in oil-colour paint, they must be white-washed or lime-coloured at least twi a year. Walls and ceilings which can be washed must be cleaned at least four tim a year.

Dry sweeping must not take place in the premises.

In all places where milk intended tor sale in the city is kept, treated, or sold, the must be water spittoons of a serviceable type. The following goods only may be so together with milk: bread, pastry, flour, meal, butter, margarine, fat, eggs, sod water and ale in bottles, chocolate and fruit juice in bottles, and also sugar goods fro closed containers. In mixed retailed shops where, on May 1st, 1904, milk and crea were sold together with other goods than those above named, the Health Committ can, for the duration ot the life of the proprietor and possibly his widow, allow t business to be conducted in the same way, but only provided that the business

nducted at the same place for which permission was given (or in the immediate cinity thereof) and with the exclusion of any articles which, in the opinion of the ealth Committee, should under no circumstances be sold together with milk. angling, laundry work, washing, etc., must not be carried on in the same room from hich milk is sold or in rooms from which there is immediate access to the shop.

The said shop must not be in direct connection with rooms where other goods an those mentioned above are offered for sale, stored or treated.

The milk-shop must not be used as a dwelling- or sleeping-room, nor must it connect th rooms which are used for sleeping in or with other rooms used as dwelling-rooms less between these and the milk-shop there is a tightly shutting door which must not kept open. Cellars without proper drains must not be used for the storage, eatment or sale of milk.

The provisions of this section do not apply to premises where milk is sold or kept ttled exclusively in hermetically sealed containers and where no bottling or canting takes place.

§ 60. When a person employed in milking, sale and handling of milk, or living rooms opening into a milk-shop, develops symptoms of an acute infectious febrile sease (including typhus, scarlet fever, diphtheria or other severe acute affection of e throat, cerebro-spinal meningitis, acute poliomyelitis, erysipelas, choleraic arrhœa), or of severe chronic infectious disease (including tuberculosis of the lungs), physician must at once be called, who, if he considers it necessary, gives notice, soon as possible, of the case to the Health Committee, which may order the removal the patient from the premises.

No person suffering from extensive or contagious skin diseases, or having large nclean sores or dressings on hands or face, no persons having intercourse with persons ffering from a serious acute infectious febrile disease, or being known as carriers of e contagious matter characteristic of such diseases, must be employed in milking the handling or sale of milk. Cleanliness in dress and person is required of rsons employed in milk-shops or in the sale of milk.

§ 61. The producer or the dairy supplying the milk to Copenhagen either direct indirect is liable for the contravention of the provisions laid down in § 49 (sub-ction 2), §§ 52, 53, 56, 57, 58 (sub-section 5) and § 60, provided that it is not hargeable to the retailer. If the above provisions or rules are not complied with, if rtificates required are not sent in, or if it appears that milk originating from stocks cattle not subjected to control is mixed with milk which is sent to Copenhagen in cordance with certificates relating to the state of health of the live-stock, the Health ommittee may decide that the person who brings the milk into Copenhagen shall future not be allowed to supply milk intended for sale in Copenhagen and originating om the producer of the milk in question, or the dairy in question, as long as the onditions made by the Health Committee for the reopening of the supply of such ilk, pursuant to these Sanitary Regulations, are not fulfilled.

In so far as the milk is not sold in closed containers provided with a supplier's seal tally, the dealer is responsible for the milk sold by him answering the description nder which it is sold.

§ 62. A reprint of the provisions of §§ 48 to 62 of the Sanitary Regulati
must be posted up in a conspicuous place in every milk-shop.

Copies of the reprint may be had free of charge in the 3rd Department of
Copenhagen Police (Sanitary Police).

The control of these regulations is divided as follows:

1. The control at the place of production;
2. The control of the milk offered for sale.

The control at the place of production includes the monthly inspection of
stock supplying whole milk to Copenhagen mentioned in § 49-II of the Sanit
Regulations, the fortnightly inspection of the stock supplying milk for infants
Copenhagen mentioned in § 52 of the Sanitary Regulations, and the inspectio
dairies and premises of the dairy managers bringing whole milk into the marke
Copenhagen.

For live-stock on farms supplying ordinary whole milk a veterinary surge
certificate must be sent in after the monthly inspection before the seventh day of
following month, and for the farms supplying children's milk the veterinary surge
examination takes place twice monthly and the certificates must be sent in
monthly. The giving and sending in of these certificates has naturally invol
difficulties, as the veterinary surgeon's certificates, duly furnished with the own
signature, have to pass through the Copenhagen receiver before being sent in to
Health Committee; the filling up of the certificate has also given rise to m
negotiations.

The inspection of live-stock is carried out by 110 veterinary surgeons. Si
these are in the employ of the milk-dealers whose suppliers they control, and have
private practice with the owners whose stock they supervise; the rest are practi
veterinary surgeons.

The expenses of this control are, apart from some dairies exclusively suppl
export cream to Copenhagen, defrayed by the Copenhagen receiver of the milk, w
in reality means that the consumer pays this part of the control.

The Health Committee, in July 1922, confirmed the rules drawn up by the Da
Veterinary Surgeons' Association for the veterinary control of stock from which
is supplied for human consumption.

These rules read as follows:

1. *The State of Health of the Live-stock.*

Previous to the examination the owner or his deputy must state whether an
the animals are ill and give information about the particular case. It is left to
discretion of the veterinary surgeon whether these animals are examined at
or later.

Cows not in milk, young cattle, and especially dry cows must be examined, but if nothing of interest is found no closer examination takes place.

Cows in milk. — It follows as a matter of course that the veterinary surgeon carefully washes his hands if, in the course of the examination of sick animals, he has come into contact with secretions from udders, uterus, etc., or if his hands have otherwise been infected. On the first examination of the cattle and of additional cows, each individual animal is subjected to a close examination, especially of the respiratory organs, the udder, the lymphatic glands, and the throat, shoulder and knee-plait glands. Each section of the udder is examined separately and milk from each teat tested.

On subsequent visits it is not necessary to examine the respiratory organs and the throat, shoulder and knee-plait glands more than twice a year (before the cattle are taken out and after having been taken in) if special observations do not necessitate renewed examinations. The udder must, however, be examined on each occasion in the manner above described.

With regard to stock supplying children's milk, where, as stated, all the cows have passed the tuberculin test, examination of the respiratory organs and throat, shoulder and knee-plait glands is not required unless under special circumstances. Cows not in milk and other animals fed otherwise than allowed for cows supplying children's milk must be kept together at one place in the stable.

The veterinary surgeon makes a statement of the result of the examination on the forms prepared for this purpose and takes notes for his own use and guidance on the next visit. All cases of sickness mentioned above in § 57 must be examined specially.

After the examination, the owner or his deputy are instructed in the treatment for each case of sickness, such as isolation and the use of the milk, etc.

2. *The Care of the Stock.*

The veterinary surgeon must see to the state of cleanliness, that dirt, cow-dung, etc., is not found on the skin of the cows, and particularly not on the belly or udder, that the litter is sufficient and good and does not consist of musty or mouldy straw or similar straw for litter. Clearing away of the dung must not take place during the milking.

3. *The Fodder for the Live-stock.*

The fodder in the stall and the adjoining fodder-rooms must be fresh. As far as live-stock supplying milk for infants are concerned, the particular directions regarding the nature of the fodder given for the supply of milk for infants must be complied with.

4. *The Milking and Treatment of the Milk.*

The persons performing the milking must always wear a washable milking-dress, and towels as well as ample clean water must always be at hand.

During the milking the stall must be well lighted, particularly behind the cows.

The cans used for milking and for the keeping and transport of the milk must be carefully cleaned.

Immediately after milking, the milk must be strained through a clean fine metal strainer, frequently cleansed. In the case of milk for infants, the milk must then be

cooled to 8° C. or below this temperature. The milk for infants must be cooled ar kept in a light, clean room not utilised for other purposes and washed beforehar with clean water.

The veterinary surgeon should try occasionally to arrange his inspection durir milking hours.

In the event of faults or non-observance of the existing conditions being asce tained through the veterinary surgeon's examination, the veterinary surgeon must after bringing the case to the knowledge of the owner or his deputy — indicate t defects ascertained in the certificate under "Comments", which must always accompanied by information as to whether the owner has promised to remedy t defects. The next certificate must indicate whether the defects still exist or wheth they have been remedied.

In cases where the veterinary surgeon is in doubt as to certain conditions, t Health Committee or the Committee's veterinary surgeon should be informed.

The certificate of health must not be made out in pencil, and the veterina surgeon should affix his name on the top left corner of the first sheet of the certificat

The following is the wording of the certificates issued by the veterinary surgeon

CERTIFICATE

REGARDING STOCKS OF CATTLE FROM WHICH "MILK FOR INFANTS" IS SUPPLIED TO COPENHAGEN (*confer* § 52 OF THE SANITARY REGULATIONS OF THE CITY OF COPENHAGEN IN THE PRESENT WORDING OF THE SAID SECTION PURSUANT TO THE SUPPLEMENT TO THE REGULATIONS DATED OCTOBER 6TH, 1924).

I, the undersigned veterinary surgeon, engaged by Mr. .... to supervise the sanitary conditions, the tending, feeding, etc., of the stock belonging to him and stabled at .... at present consisting of ...... milch cows, hereby declare that, on the ...., 192..., in compliance with the rules overleaf, and the "Rules for the Veterinary Inspection of Stocks from which Milk is supplied for Human Consumption", confirmed by the Health Committee for Copenhagen in July 1921, I have made a careful inspection of the said cattle, and, in compliance with the said rules, have given the owner the necessary directions and orders for the sound condition of the milk. I further declare that, to the best of my knowledge, no conditions exist which may be presumed to be in any way at variance with the strict compliance with these rules.

On my inspection the following milkers (designated by numbers or marks) were:

Found to be suffering from:

Tuberculosis	Udder tuberculosis	Other diseases of the udder	Diseases of the teats

Diseases of uterus	Other diseases

Suspected of:

Tuberculosis	Udder tuberculosis	Other diseases

Remarks on:
- Isolation of sick cows, the milk from same, and the like.
- The state of cleanliness of the cows, and the like.
- The state of cleanliness of the stable, and the like.
- Milking and treatment of the milk.

Other remarks:

(Signature of Veterinary Surgeon.)

I, the undersigned owner of the stock mentioned in the above Veterinary Certificate, hereby bind myself strictly to observe the rules overleaf, as well as the directions and orders given me by the inspecting veterinary surgeon.

(Signature of the Owner).

[*Reverse of Certificate.*]

RULES

LAID DOWN PURSUANT TO THE SANITARY REGULATIONS FOR COPENHAGEN, § 52 (*confer* SUPPLEMENT OF OCTOBER 6TH, 1924), TO BE OBSERVED BY OWNERS OF STOCKS OF CATTLE FROM WHICH MILK FOR INFANTS IS SUPPLIED TO COPENHAGEN.

Every owner of cattle from whose stock milk for infants is supplied to Copenhagen sh comply with the provisions contained in the Sanitary Regulations for Copenhagen in so far they are applicable to the production of milk for infants, and shall likewise observe the followi rules:

1. The stock shall be subjected to the tuberculin test at least once a year.

All animals which have passed the test shall be provided with an ear-mark by the veterina surgeon undertaking the test. Information of this shall be sent to the Health Commit simultaneously with the sending in of the tuberculin lists, drawn up by the veterinary surgeon, the Committee, which shall take place as soon as possible after the undertaking of the test.

Additions to the stock must not be admitted, nor must their milk be supplied as milk infants until they have passed the tuberculin test.

Cattle which have not passed the tuberculin test shall be kept strictly isolated from the r of the stock, and the owner is bound to get rid of them as soon as possible.

2. A veterinary surgeon shall inspect the whole stock every fortnight.

The owner shall give the inspecting veterinary surgeon all information desired regardi the stock, stable, feeding and the treatment of the milk, and is bound to comply with the directio given him by the veterinary surgeon.

In connection with the inspection, the veterinary surgeon shall issue a certificate in accordar with overleaf form prescribed by the Health Committee for Copenhagen, and the owner shall si the declaration printed at foot of the certificate, whereby he binds himself to observe the ru laid down by the Health Committee and the directions and orders given by the inspecti veterinary surgeon.

3. Any cattle which the veterinary surgeon on his inspection finds suffering from any of t diseases mentioned in §57 * of the Sanitary Regulations, or from other diseases making the m unfit, shall by order of the veterinary surgeon be removed from the stable, or, if it is deem sufficient, be placed in an isolated part of the stable.

Milk originating from cows which the veterinary surgeon in this way on his inspection l ordered removed or isolated must not be supplied to Copenhagen, and the cattle must not replaced in the stock, nor the milk used, until the veterinary surgeon has given permission. T sick cattle shall either be milked last or by a separate person.

In the event of diseases, as mentioned above, occurring between two visits of the inspecti veterinary surgeon, the owner shall isolate the animal or animals in question, and retain the mi giving the inspecting veterinary surgeon information on his next inspection. If there is reas to assume that cases of sickness which have occurred point to infectious diseases or poisoning, t controlling veterinary surgeon shall be informed at once. Milk from cows that have calved mu not be sent to Copenhagen as milk for infants within a period of ten days from the calving, r milk from cows giving less than 3 kilogrammes per day.

4. The stable shall be light, well ventilated and provided with suitable drains.

Cows whose milk is used for infants must not be kept in the same stable as pigs, poultry other domestic animals.

The stable shall be kept clean.

Clearing away of dung, spreading of straw for litter and airing must be completed half hour before the milking is to commence. In cases where this for special reasons cannot complied with, as far as the morning milking is concerned, the dung shall be scraped into t gutter, and the stable aired half an hour before the milking is to take place.

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* The text of § 57 is given at the end of the original of this certificate.

Fodder which is mouldy or in other way defective, or fodder giving off a strong smell, must ›t be kept in the stable or in its immediate neighbourhood.

The stable shall be carefully cleaned every six months and lime-milk poured over oor and gutter. One of these cleanings must be completed at the latest one month after the eding of the cattle in the field having been commenced in the spring, and this cleaning shall clude whitewashing of walls and roof. Strongly smelling disinfectants must not be used.

5. The cows shall be kept clean, free from dried cow-dung on thighs, belly and udder.

Twice a year while the cows are stabled they must be sheared on thighs, udder, the part of ie belly which is next to the udder, and on the tail. One of these shearings shall take place nmediately after the stabling in the autumn.

6. All fodder and water shall be perfectly clean. The necessary quantity of good and sound tter shall be used.

The inspecting veterinary surgeon must be informed of the composition of the fodder.

The following rules apply to the feeding of all animals kept in the stable:

(*a*) Of root-crop only carrots, beetroots *(Beta vulgaris)* and potatoes must be used up to a maximum quantity of 30 kilogrammes per cow daily.

(*b*) Of molasses fodder up to 1 kilogramme, and of cottonseed cake up to $^1/_2$ kilogramme per cow daily may be used.

(*c*) Leaves and waste from any kind of beets, ensilage, cabbage-leaves, dregs, mash, buckwheat, mustard, as well as rapeseed cake containing a large quantity of mustard-oil, must not be used.

(*d*) Frequent and abrupt changes of fodder are to be avoided.

(*e*) If stall-feeding takes place in summer the veterinary surgeon shall endorse the certificate to that effect.

7. The milking shall be performed in a clean way, and during the milking the stable shall e well lighted, particularly behind the cows. It is prohibited to dip the hands in the milk, as ell as to wet the hands by allowing the milk to flow over the palm of the hand into the pail. f it appears that the milk has changed character it must not be supplied (*confer* sub-section 3).

Milking machines must not be used.

8. The persons performing the milking, or such persons as are employed in the treatment f the milk, must during their work wear a special milking-dress to cover their ordinary working-ress. The milking-dress must be made of washable stuff, and shall be washed as often as equired, at least once a week.

Milking-rags for the rubbing-off of the udders and teats of the cows shall be at hand in a ufficient number to enable the persons performing the milking, if they find it necessary during ie work, to change same. The milking-rags shall be carefully washed in hot water with soda, ried and aired after every milking process. Milking-rags must not be used for towels nor be nsed in water used for personal ablution during the milking.

The milk-stool must be kept clean.

Washing of hands must take place as often as necessary during the milking, and at any rate very time the milking person, after having emptied the pail, recommences milking.

If a pail is used for washing one's hands it must be clean and not used for any other purpose, nd it shall be cleansed every day and kept in the same place as the other pails.

Towels must be at hand.

Milking-dresses and all utensils used in the milking and the treatment of the milk shall not e kept in the stable.

9. Immediately after milking, the milk must be strained through a clean metal strainer, which hall be cleansed frequently during the milking. Straining-bags must not be used. If a strainer ith a wadding-filter is used, the latter shall be frequently renewed during the milking. Straining f the milk must not take place in the stable.

10. As soon as possible after the straining the milk shall be cooled down to at least 8° C.
If the milking takes place in the field, not more than one hour must elapse before the m which was first milked is taken home for cooling.

11. All objects and utensils coming into contact with the milk shall be kept clean, and m not be used for any other purpose than treatment of the milk.
Pails, strainers, coolers or similar implements shall be made of tinned material, free fr rust.
After having been cleaned, all transport cans and pails must be placed in a reversed positi on a covered pail-rack for the purpose of being dried and aired.
Brushes and similar utensils used in the cleansing of milking implements must be kept cle
Water used for cleansing must be clean. Water taken from a ditch or similar place m not be used.

12. Premises on which milk is cooled or stored shall be light, clean, provided with a pro draining system, and must not be used for any other purpose.
As often as required, and at least four times a year, such premises shall be thoroughly clea and afterwards whitewashed.
Basins in which milk is placed for cooling or storing shall be provided with a proper dra The water shall be changed every day, and the basins shall at frequent intervals be subjected a thorough cleansing and lime-washing.

13. Veterinary surgeons delegated by the Health Committee of Copenhagen, as well other officials acting on behalf of the Health Committee, shall be freely admitted by the ow to inspect the above conditions.

November 18th, 1924.

THE HEALTH COMMITTEE FOR COPENHAGEN.

No. ....

(The distinguishing number under which the producer is registered in the weighing records of the dairy.)

CERTIFICATE

EGARDING STOCKS OF CATTLE FROM WHICH WHOLE MILK, ETC., IS SUPPLIED TO COPENHAGEN (*confer* § 49, SUB-SECTION 2, OF THE SANITARY REGULATIONS OF THE CITY OF COPENHAGEN IN THE PRESENT WORDING OF THE SAID SUB-SECTION PURSUANT TO THE SUPPLEMENT TO THE REGULATIONS OF OCTOBER 6TH, 1924).

I, the undersigned veterinary surgeon, engaged by Mr. .... to supervise the sanitary onditions, the tending, feeding, etc., of the stock of cattle belonging to him and stabled at .... er .... at present consisting of .... milkers, hereby declare that, on the ...., 92..., in compliance with the rules overleaf and the "Rules for the Veterinary Control of Stocks rom which Milk is supplied for Human Consumption" approved by the Health Committee of openhagen in July 1921, I have made a close inspection of the said stock, and have, in compliance ith the rules, given the necessary directions and orders for the sound conditions of the milk. o the best of my knowledge there are no conditions which in any way may be considered to be at ariance with the strict compliance with these rules.

On my inspection the following milkers (designated by numbers or marks) were:

'ound suffering from:

Tuberculosis	Udder tuberculosis	Other diseases of the udder	Diseases of the teats

Diseases of uterus	Other diseases

uspected of:

Tuberculosis	Udder tuberculosis	Other diseases

Remarks on:
- Isolation of sick cows, the milk from same, and the like.
- The state of cleanliness of the cows, and the like.
- The state of cleanliness of the stable, and the like.
- Milking and treatment of the milk.

Other remarks: ....

(Signature of the Veterinary Surgeon.)

I, the undersigned owner of the stock of cattle mentioned in the above veterinary certificate, ereby bind myself strictly to observe the rules overleaf as well as the directions and orders given ne by the inspecting veterinary surgeon.

(Signature of the Owner.)

[*Reverse of Certificate.*]

RULES

LAID DOWN PURSUANT TO THE SANITARY REGULATIONS FOR COPENHAGEN, § 49, SUB-SECTION (*confer* SUPPLEMENT OF OCTOBER 6TH, 1924), TO BE OBSERVED BY OWNERS OF LIVE-STOCK FROM WHICH WHOLE MILK OR CREAM (INCLUDING EXPORT-CREAM) IS SUPPLIED TO COPENHAGEN, OR FROM WHICH SKIMMED MILK, INTENDED FOR THE MANUFACTURING OF EXPORT-CREAM, TO BE SUPPLIED TO OR MANUFACTURED IN COPENHAGEN ORIGINATES.

Every owner of cattle from whose stock milk or cream, as stated above, is supplied Copenhagen must comply with the provisions contained in the Sanitary Regulations f Copenhagen, in so far as they are applicable to the production of milk, and shall likew observe the following rules:

1. To have the whole stock examined at least once a month by a veterinary surgeon.

The owner shall give the inspecting veterinary surgeon all information desired regardi live-stock, stable, feeding and treatment of the milk, and is bound to comply with the directio given by the veterinary surgeon.

In connection with the inspection, the veterinary surgeon shall issue a certificate in accor ance with overleaf form prescribed by the Health Committee for Copenhagen, and the owner sh sign the declaration printed at foot of the certificate, whereby he binds himself to observe t rules laid down by the Health Committee and the directions and orders given by the inspecti veterinary surgeon.

2. Any cattle which the veterinary surgeon finds suffering from any of the diseases mention in §57[1] of the Sanitary Regulations, or from other diseases making the milk unfit, shall by ord of the veterinary surgeon be removed from the stable, or, if it is deemed sufficient, be plac in an isolated part of the stable.

Milk originating from cows which the veterinary surgeon in this way at his inspection h ordered removed or isolated must not be supplied to Copenhagen, and the cattle must not replaced in the stock, nor the milk used, until the veterinary surgeon has given permission. T sick cattle shall either be milked last or by a separate person.

In the event of diseases, as mentioned above, occurring between two visits of the inspecti veterinary surgeon, the owner shall isolate the animal or animals in question and retain the mil giving the inspecting veterinary surgeon information on his next inspection. If there is reas to assume that cases of sickness which have occurred point to infectious diseases or poisonin the controlling veterinary surgeon shall be informed at once.

3. The stable shall be light, well ventilated and provided with suitable drains.

The milkers must not be kept with pigs and poultry nor with a greater number of oth domestic animals.

The stable shall be kept clean.

Cleansing, littering and airing must be completed half an hour before the milking is commence. In cases where this, for special reasons, cannot be complied with as far as the morni milking is concerned, the dung shall be scraped into the gutter, and the stable aired half an ho before the milking is to take place.

Fodder which is mouldy or in other way defective, or fodder giving off a strong smell, as, f instance, Swedish turnips, fermenting waste of any kind of beets, must not be kept in the stable in its immediate neighbourhood.

The stable shall be carefully cleaned every six months and lime-milk shall be poured ov floor and gutter. One of these cleanings must be completed at the latest one month after t feeding of the cattle in the field has been commenced in spring, and this cleaning shall inclu whitewashing of walls and roof.

Strongly smelling disinfectants must not be used.

4. The cows shall be kept clean, free from dried cow-dung on thighs, belly and udder.

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[1] The text of 57 § is given at the end of the original of this certificate.

Twice a year while the cows are stabled they must be sheared on thighs, udder, the part of ıe belly which is next to the udder, and on the tail. One of these shearings shall take place ımediately after the stabling in the autumn.

5. All fodder and water shall be perfectly clean. The necessary quantity of sound and good raw for litter shall be used.

6. The milking shall be performed in a clean way, and during the milking the stable shall be ell lighted, particularly behind the cows. It is prohibited to dip the hands in the milk, as well : to wet the hands by allowing the milk to flow over the palm of the hand into the pail.

If it appears that the milk has changed character it must not be supplied (*confer* Subction 2).

7. The persons performing the milking, or such persons as are employed in the treatment the milk, must during their work wear a special milking-dress to cover their ordinary working-ress. The milking-dress must be made of washable stuff, and shall be washed as often as quired, at least once a week.

Milking-rags for the rubbing-off of the udders and teats of the cows shall be at hand in a fficient number to enable the persons performing the milking, if they find it necessary during e work, to change same. The milking-rags shall be carefully washed in hot water with soda, ied and aired after every milking process. Milking-rags must not be used for towels, nor be nsed in the water used for personal ablution during the milking.

The milking-stool must be kept clean.

Washing of hands must take place as often as necessary during the milking, and at any rate ery time the milking person, after having emptied the pail, recommences milking.

If a pail is used for washing one's hands it must be clean and not used for any other purpose, ıd it shall be cleansed every day and kept in the same place as the other pails.

Towels must be at hand.

Milking-dresses and all utensils used in the milking and the treatment of the milk shall not be ept in the stable.

8. Immediately after milking the milk must be strained through a clean metal strainer, hich shall be cleaned frequently during the milking. Straining-bags must not be used. If a rainer with a wadding-filter is used, the latter shall be frequently renewed during the milking. raining of the milk must not take place in the stable.

9. All objects and utensils coming into contact with the milk shall be kept clean, and must ot be used for any other purpose than treatment of the milk.

Pails, strainers, coolers or similar implements shall be made of tinned material, free from rust.

After having been cleaned, all transport cans and pails must be placed in a reversed position ı a covered pail-rack for the purpose of being dried and aired.

Brushes and similar utensils used in the cleansing of milking implements must be kept clean.

Water used for cleansing must be clean. Water taken from a ditch or similar place must not e used.

10. Premises on which milk is cooled or stored shall be light, clean, provided with a proper aining system, and must not be used for any other purpose.

As often as required, and at least four times a year, such premises shall be thoroughly cleaned ıd afterwards whitewashed.

Basins in which milk is placed for cooling or storing shall be provided with a proper drain. he water shall be changed every day, and the basins shall at frequent intervals be subjected to thorough cleansing and lime-washing.

11. Veterinary surgeons delegated by the Health Committee of Copenhagen, as well as her officials acting on behalf of the Health Committee, shall be freely admitted by the owner inspect the above conditions.

November 18th, 1924.

THE HEALTH COMMITTEE FOR COPENHAGEN.

Diseases.

It has appeared from the veterinary certificates sent in to the Secretary of th Health Committee during the period January 1st to December 31st, 1924, that regards a great number of cows it has been prohibited either permanently or temp rarily to supply the milk originating from these cows owing to diseases among same.

The diseases endorsed on the veterinary certificates, arranged in groups mon by month, will appear from the subjoined schedule.

Number of Diseases Reported.

Year 1924	Cows suffering from:				Cows suspected of:				
Month	Tuberculosis of the udder	Tuberculosis	Diseases of the udder	Other diseases	Tuberculosis of the udder	Tuberculosis	Diseases of the udder	Other diseases	Total
January .	1	16	805	130	3	7	3	—	96
February .	—	9	843	255	3	6	3	1	1,12
March . .	—	7	1,059	252	13	3	—	—	1,33
April. . .	2	18	1,238	665	4	2	—	—	1,92
May . . .	2	15	1,361	144	2	1	—	—	1,52
June . . .	—	13	1,061	112	6	1	—	—	1,19
July . . .	—	19	1,016	70	2	5	—	1	1,11
August . .	—	21	1,041	92	2	5	—	—	1,16
September	—	6	778	103	3	3	—	—	89
October. .	1	7	1,141	160	1	20	3	2	1,33
November	1	14	1,017	149	2	11	—	—	1,19
December.	—	7	954	119	1	2	—	—	1,08
Total. . .	7	152	12,314	2,251	42	66	9	4	14,84

The owners have generally displayed a clear understanding of the necessity withholding the milk of sick cows.

Since April 1st, 1921, an additional link has been established in the control the place of production, as an assistant veterinary surgeon, under the Chief Veterina Surgeon of the Health Committee, has been appointed to participate in all the wo of the milk control. His principal work is to visit the producers, to control th execution, on behalf of the Health Committee, of the fixed conditions and speci orders given by the controlling veterinary surgeon for the particular cases, and al to give general advice and directions.

The control of the milk offered for sale comprises two subdivisions:

1. Inspection in Copenhagen of dairy plants, milk-shops and cow-keeper premises.

2. Laboratory tests of milk samples bought by the sanitary police or hande in to the sanitary police by private parties.

A total number of 3,624 inspections of dairies and milk-shops and 622 inspections cow-stables has been effected at irregular intervals, partly by the veterinary rgeons of the Health Committee and partly by the staff of the sanitary police.

In 1924, the total number of cow-stables in Copenhagen was 77 with 81 cows, z., in the old part of the city, 2 cow-stables with 28 cows, and the districts included) cow-stables with 53 cows.

During the year, the staff of the sanitary police have, at various railway-stations, ken the temperature of the milk destined for the city.

Sampling of Milk.

In 1924, milk was sold from about 1,600 milk-shops (including the retail vans of ie dairies), and during the year 9,943 samples of milk and cream have been bought examined by the sanitary police.

In the course of the year, the following samples have been sent to the laboratory r examination as to quality:

308 samples of "milk for infants", 362 samples of Jersey milk, 7,084 samples "whole milk", of which 28 were taken in the stable, 77 samples of half-skimmed ilk, 652 samples of buttermilk, 481 samples of cream for coffee (13 per cent), 30 samples of cream for whipping (30 per cent) and 102 samples of export-cream.

In all cases where dirt has been observed in the milk, and in several cases where ie bacteria found have given cause for an inspection of the live-stock, special eterinary examinations have been ordered.

The bacteriological investigations to which the milk control has given rise have incipally been germ-counting, which has, for instance, been undertaken in connecon with investigations based on the fermentation reduction test and the catalysis st.

Examinations as to the degree of acidity (number of cubic centimetres 1/10 aOH, which neutralise 100 cubic centimetres of milk) have been carried out.

Preservatives have during the last few years rarely been traced in milk. None as found in 1924.

THE RIGSHOSPITAL.

By Dr. H. F. Ollgaard.

The "Rigshospital", or National Hospital, occupies a special place among tl hospitals of Copenhagen because, as its name indicates, it receives patients from a over the kingdom. As an educational establishment it represents an importa effort on the part of the State to provide for the training of doctors, midwives an nurses.

The hospital includes:

	Beds.
1. Two departments of internal medicine	254
2. Two surgery departments	254
3. Ophthalmological department	20
4. Otolaryngological department	17
5. Dermatological department	84
6. Children's department	62
7. Two maternity departments, with 183 beds for adults and about 100 for children	283
	974

One of the maternity departments includes a gynæcological section, with 3 beds. This department is for the instruction of young doctors, whereas the other for the instruction of midwives. The two maternity departments possess, in commo two sections, one for women about to become mothers and the other for wome undergoing treatment after childbirth.

The hospital contains special halls used as polyclinics, attached to each of tl seven general departments of the institution.

Each department has its own amphitheatres, laboratories, libraries and colle tions for the use of students following the courses. In addition, there are tl following buildings which serve the whole hospital: kitchen, laundry, heatin apparatus, baths, massage establishment, X-ray room, disinfection apparatu mortuary, chapel and church.

A special building for nurses attached to the medical and surgical departmen is also used as a school for nurses; there is accommodation for forty pupils in al The other nurses of the hospital are housed in their respective departments.

The administrative building includes offices, rooms for the reception of patients ı first arrival, operating-room for accident cases brought in from the town (to hich is attached a patients' room), quarters for the heads of clinics and resident licers of the medical and surgical departments, X-ray room, quarters for the super-tendent, etc.

In the other departments there are quarters for the medical officers attached these departments. The director and chief medical officers are housed in special uildings.

* * *

The area occupied by the hospital is 97,670 square metres. As the general lan of the hospital shows, the main entrance is in the Blegdamsvejen Avenue, with carriage entrance in the centre of the administrative building. A large garden r the use of the patients occupies the central area and around this are grouped the ternal medicine and surgical department buildings; on the right, five medical wings nd the medical amphitheatre; on the left, similar buildings for the surgical depart-nents and the building which contains the operating-rooms. On the fourth side the patients' garden are the isolation wards of the two departments, with the hurch in between.

A corridor provides direct communication between the medical and surgical ings and the lecture-rooms (amphitheatres) and operating-rooms. Around this roup of buildings runs a pathway leading on the right to the otolaryngological and ermatological departments, the nurses' building, the baths and mortuary, and on ıe left to the ophthalmological department, the children's department and the mater-ity departments, including the gynæcological section. The latter departments ossess a special main entrance in the Juliane Maries Vej Avenue. There is also a rge entrance at the rear for the kitchen, laundry, heating, stables, etc. All the oliclinics and the quarters of the director and the chief medical officers com-nunicate directly with the adjacent streets.

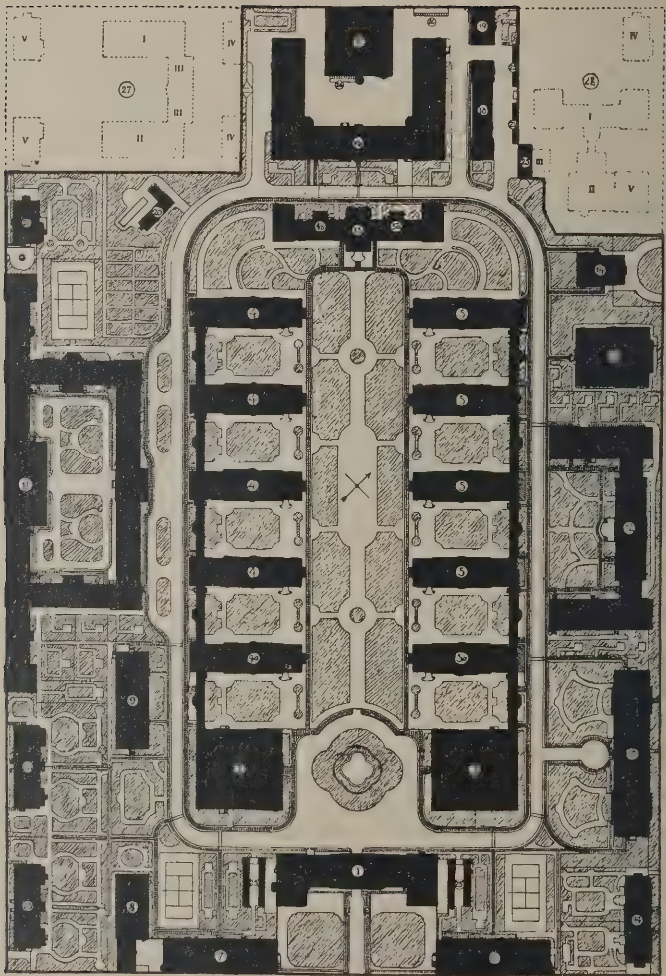
The hospital buildings, including storage-rooms, linen-store, bicycle-sheds, ccommodation for subordinate staff and stables, cover in all an area of about 27,000 quare metres. The cost of the construction of these buildings and annexes, not ncluding furnishing and equipment, amounted to about 10,300,000 francs.

* * *

All the buildings have basements, occupied mainly by the heating and entilating apparatus, but also used as store-rooms, bicycle-sheds, stables for xperimental animals, workshops, wash-rooms, etc., and for the accommodation f some of the subordinate staff.

The various buildings are all connected by underground galleries through hich run various kinds of pipes. The galleries are in moulded concrete and heir ceilings are in reinforced concrete. Nothing is carried along these underground alleries or along the adjacent basement corridors, which contain only the main team pipes, etc.; the chief engineer and his assistant are the only persons allowed o enter.

The foundations of all the buildings are in moulded concrete on a basis of hard lay, and all the buildings are in brick from the basement floor upwards; rough ranite, sandstone and limestone blocks are used only for plinths, door-frames and ertain constructional portions of the edifice.



General Plan of the Hospital.

1. Administration buildings.
2. Surgical amphitheatre.
3. Medical amphitheatre.
4. Surgical wing: public rooms.
4*a*. Surgical wing: private rooms.
4*b*. Isolation ward.
5. Internal-medicine wing: public rooms.
5*a*. Medical wing: private rooms.
5*b*. Isolation ward.
6. Otolaryngological department, with surgical and medical policlinics.
7. Ophthalmological department.
8. Children's policlinic.
9. Children's hospital.
10. Dermatological department.
11. Maternity hospital.
12. Nurses' wing.
13. Baths.
14. Chapel.
15. Church.
16. Kitchen and laundry.
17. Central heating.
18. Workshops, stables and disinfection ap paratus.
19. Accommodation for subordinate staff.
20. Greenhouses.
21. House of the professor of gynæcology.
22. House for a surgeon and chief gynæco logist.
23. House of the director and a chief surgeon
24. House for the two heads of the medica departments.
25. Bicycle-sheds.
26. Kitchen garbage pits (middens).
27, 28. Institutes of general pathology, pa thological anatomy, etc.

The façades of the buildings inside the encircling pathway and the façades of ıe maternity hospital facing the courtyard are rough-plastered with lime; the other ıçades are all in red brick.

The flat roofs of the various wings are in reinforced concrete, with a double ›vering of asphalt; the other roofs are in red tiles. The various floors in the patients' uildings are separated by partitions rendered fire-proof, mainly by reinforced ›ncrete.

The flooring of the rooms and apartments in all buildings of the hospital is ›mposed of a single material without joins; the coverings used are magnesite in ıe rooms, halls and corridors, terrazzo in the baths and water-closets, and felspar abs in the operating-rooms, kitchens and laundries.

In the buildings for dwelling purposes the floors are supported by beams and oards in the usual manner.

In the buildings for patients all walls are spatula plastered, painted with three ›ats of oil paint and then a coat of varnish or enamel to a height of about 2 1/4 ıetres from the floor; the ceilings and the upper part of the walls are whitewashed. he walls and ceilings in the operating-rooms, the maternity-rooms for women in ıbour, and other similar rooms are painted all over with oil paint and lacquered.

In all the operating-rooms, kitchens, laundries, water-closets, larders, dirty-nen cupboards, etc., the walls are faced to a height of about 2 1/4 metres with juare enamel tiles; the same system is adopted for the walls at the back of the ıks. Square green enamel tiles are set along the floor chamfers, and in all patients' ›oms the angles formed where the walls and ceiling meet are rounded off.

There are double windows in all rooms.

The interior staircases are mostly constructed of pine and are provided with ak protection boards.

ADDITIONS AND CORRECTIONS

TO "HEALTH ORGANISATION IN DENMARK", 1924
(*Doc. C.H./E.P.S./49*).

TRYDE: *Denmark: The Country and its Population.*

Page 13, section 3, 1st and 2nd line: read: "The board has to make its acquainted with the local health services both in Copenhagen and in the provinces.

WESTERGAARD: *General Statistics.*

Page 21, section 1, 9th to 13th line: instead of: "Of ...... 4,000" read: "Of 36,0 temporarily resident in 1921, 30,000 stated their place of residence to be elsewhe within the boundaries of Denmark. Only 25,000 temporarily absent persons we registered as living elsewhere in Denmark, whereas no information was giv concerning 5,000."

Page 21, section 3, 2nd line: instead of 1911 read 1921.

Page 21, section 3, 3rd line: instead of "the majority" read "half".

Page 21, section 3, 4th line: instead of 25,000 read "about 50,000".

Page 21, section 4, 1st line: instead of 1912 read 1921.

Page 22, section 4, 4th line: instead of "page" read "age".

Page 22, section 5, 9th line: instead of 12,000 read 17,000.

Page 22, section 5, 10th line: instead of 1911 read 1921.

Page 23, section 2, 12th line: instead of 1911 read 1921.

Page 23, section 2, 14th line: to be struck out: "all in all, 140 heads wi division according to sex".

Page 23, section 2, 14th line: instead of "seven" read "eight".

Page 23, section 3, 5th to 9th line: instead of "Thus ..... one-seventh" rea "Thus in 1921, of the Danish-born population of the metropolis, two-fifths were bo outside the town, while of the Danish-born inhabitants of the provincial towns abo two-fifths were from the rural districts. If there were no migrations between t rural districts and the towns, the rural population would be one-fourth mo numerous, and that of the metropolis would be reduced by one-sixth."

Page 25, section 1, 16th line: instead of "1911-1915, 57" read "1916-1920, 51

Page 25, section 1, 17th line: instead of 30 read 27.

Page 25, section 1, 17th line: instead of 7 read 6.

Page 25, section 1, 18th line: instead of "In the reports for 1911-1915" read In later reports".

Page 25, section 2, 4th line: instead of "next" read "the following".

Page 25, section 2, 5th line: instead of 1922 read 1923.

Page 25, section 2, 5th line: instead of 74,000 read 75,000.

Page 25, section 2, 6th line: instead of 39,000 read 38,000.

Page 25, section 3, 3rd line: instead of "1911-1915 even 58" read "1916-1920 ven 57".

Page 25, section 4, 1st line: instead of "death-rate" read "mortality".

Page 26, section 1, 1st line: instead of "table of death-rates" read "mortality ables".

r. H. J. Hansen: *Danish Medical Statistics.*

Page 43: The following lines to be added to Table I:

1923	16,205	115	21,681	112	2,267	772	3,898	857
1924	16,648	117	21,453	111	2,356	837	3,881	850

Page 44 : The following lines to be added to Table II:

1923	560	1.7	16	0.1	27	0.1	5,692	17.1	78	0.6	117	0.6
1924	482	1.4	20	0.1	14	0.07	5,241	15.5	94	0.7	108	0.6

Page 45: The following lines to be added to Table III:

1923	3,851	11.5	18	0.1	21	0.1	244	31.8	32	10.7	40	8.6
1924	3,084	9.1	16	0.1	15	0.08	240	31.7	37	12.8	28	6.0

Page 46: The following lines to be added to Table IV:

1923	20,183	60.4	267	1.9	417	2.2	4,828	645	215	73.3	345	75.9
1924	24,361	72.2	267	1.9	468	2.4	5,594	758	210	74.6	390	85.3

Page 47: The following lines to be added to Table V:

1923	63	0.2	36	0.3	20	0.1	14,015	42.3	73	0.5	25	0.1
1924	61	0.2	44	0.3	25	0.1	13,568	40.2	65	0.5	26	0.1

Page 48: The following lines to be added to Table VI:

1923	1,455	10.3	1,625	8.4	1,049	7.4	1,169	6.1	2,184	15.4	2,432	12.6
1924	1,563	11.0	1,792	9.2	1,199	8.4	1,268	6.5	2,149	15.1	2,541	13.0

Page 50 (Table VII). The figures 1920-1924 are as follows:

	Per cent
Morbi organor. respirationis	13.5
Cancer	12.5
Morbi epidemici	9.3
Morbi organor. circulationis	11.0
Morbi cerebri et medullæ spinalis	11.0
Marasmus senilis	10.1
Tuberculosis	8.8
Vitia innata	5.2
Morbi organor. digestionis	3.4
Morbi organor. uropoëticorum et genitalium	3.2
Morbi constitutionales	2.3
Causa mortis non indicata	2.1
Casus mortiferi	1.9
Morbi externarum partium	1.5
Suicidia	1.3
Morbi internarum partium varii	1.7
Syphilis	0.4
Atrophia infantilis	0.3
Alcoholismus	0.2
Mors in puerperio [1]	0.2
	99.9

Dr. Gordon NORRIE: *The Personnel in the Medical Service.*

Page 67, section 3, 9th line: instead of "1921..... 529" read "1924..... 601

J. FIBIGER: *Cancer in Denmark.*

Page 122, 2nd line from the bottom. After "still does so" insert the followi sentence: "Quite recently an agreement has been made aiming at the hospit paying now if possible 5 (Danish) crowns for each histological examination made the examiners of the committee in cases where the poor hospital patients cannot affo to pay for examination."

Page 124: A second footnote referring to the figure 8,324 (fifth line from t bottom) to be inserted as follows: "At present (at the end of the year 1925) the numb of examined specimens may be about 11,000."

MÖRKEBERG: *Meat Inspection in Denmark.*

Page 141, section 7, 7th line, instead of 1922 read 1924.

Page 141, section 7, 8th line: instead of 265,000 read 392,426.

Page 141, section 7, 8th line: instead of "only one pig" read "no pig".

Page 141, section 8, 3rd line: instead of "about 300" read "384".

Page 141, section 8, 5th line: instead of "36" read "41".

Page 141, section 8, 6th line, instead of "about 150" read "271".

Page 141, section 8, 8th line: instead of 115 read 127.

:RISTIANSEN: *Inspection of Milk.*

Page 160, 4th line from the bottom to page 162, 10th line from the top: to be uck out and the following regulations to be inserted:

§ 1.

Milk and cream may only be offered for sale under the designations contained §§ 3 to 14.

When an article is offered for sale under the designation milk, but without itement as to kind, it shall be considered as having been offered for sale under the signation "whole milk".

§ 2.

No addition of water to milk and cream may take place. In so far as this gulation does not expressly permit of exceptions to this rule, it shall likewise be ohibited to add any other substance to milk or cream, as well as to subject milk or eam to any form of treatment with such substances.

§ 3.

Only milk which has not been deprived of any of its natural ingredients may be signated as "whole milk", and milk sold as "whole milk" may not be mixed with parator milk, skimmed or partly skimmed milk, homogenised or pasteurised milk, milk which in any other way has been artificially heated. Whole milk shall contain least 3 per cent of natural butter-fat.

Whole milk originating exclusively from Jersey cows and containing at least 75 per cent of natural butter-fat may be designated as Jersey milk.

§ 4.

When milk has been deprived of a part of its natural butter-fat it shall be signated as skimmed milk. Such milk shall otherwise comply with the rules fixed r whole milk.

Skimmed milk containing at least 0.75 per cent of natural butter-fat may be signated as half-skimmed milk.

§ 5.

An article being designated as cream shall consist of the separated fatty part of e milk, and shall contain at least 9 per cent of natural butter-fat.

If the cream contains less than 13 per cent of natural butter-fat it shall be signated as cream No. 3. If the content of butter-fat of the cream is at least 13 per

cent it may be designated as cream No. 2; if the contents of butter-fat is at least 18 cent it may be designated as cream No. 1; and if the contents of butter-fat is least 30 per cent it may be designated as "cream for whipping". If cream is be sold in bottles the label shall state the percentage of butter-fat.

§ 6.

When milk or cream of the designations mentioned in §§ 3 to 5 has turned so or become acescent, it shall be labelled accordingly, for instance as "sour mill "sour skimmed milk", "acescent skimmed milk", and the like.

When whole milk has become acescent it may be designated as curds. Milk m be designated as Youghurt and Kefir, but only in case special Youghurt cultu or Kefir cultures have been applied.

§ 7.

Milk designated as "children's milk" shall consist of raw whole milk originat from cows which have been tested with tuberculine not more than one year before, a which are subject to regular veterinary inspection. The milk shall otherwise, regards production and offering for sale, comply with the special rules laid down in sanitary regulations of the locality concerned.

§ 8.

Milk or cream may only be designated as sterilised in case it has been subjec to such treatment that all existing bacteria and other germs are killed, and it m only be offered for sale in containers which are provided with stoppers which ensure the keeping qualities of the milk.

§ 9.

Milk or cream may only be designated as pasteurised in case the milk or crea not later than 24 hours after the milking, has been heated to at least 80° C. a thereafter cooled to 12° C.

Pasteurised milk or cream must not give reaction on the paraphenylendiamin t (Storch's reaction).

Pasteurised milk or cream must only be offered for sale in or from contain on which the pasteurising date and the name of the pasteurising firm are clea indicated.

Milk or cream having been subjected to any other heating process than pasteu sation or sterilisation must not be offered for sale unless this form of treatm has been especially approved of by the Minister of Justice, and it must not be offe for sale as pasteurised, or under any other description in which the word pasteuri is included. This rule does not apply to milk powder and condensed milk.

When milk or cream has been subjected to pasteurisation, or any other permissible eatment, the nature of this treatment shall, when the milk or cream is offered for le, be clearly indicated on the container or bottle holding the milk or cream.

Any mixing of pasteurised milk, or milk treated in any other way, with raw milk prohibited.

§ 10.

Milk or cream shall be designated as homogeneised when it has been subjected such a treatment that the fat globules have been greatly diminished in size, so at the article forms a uniform (homogeneous) emulsion, and does not by standing rm cream or butter.

§ 11.

An article designated as buttermilk shall consist of the product from the churning cream or milk which remains in the churn when the butter has been removed from e latter. Buttermilk must not have been deprived of any of its natural ingredients or have been mixed with foreign substances of any kind beyond what is necessary r the production of butter.

Buttermilk shall contain at least 6.5 per cent of milk solids. Buttermilk containg less than 8.5 per cent of milk solids shall be designated as buttermilk No. 2. If e content of milk solids amounts to at least 8.5 per cent, it may be designated as uttermilk No. 1. The offering for sale of buttermilk which contains a smaller amount milk solids than provided shall, however, not be regarded as a transgression of the resent regulation if the deficiency does not amount to more than 5 per cent of the ilk solids stipulated.

§ 12.

An article designated as condensed or concentrated milk shall be the product of vaporation of whole milk or skimmed milk, with or without cane-sugar (saccharose). the article contains cane-sugar it shall be labelled accordingly. Addition of any ther substance is prohibited.

The designations "milk powder" or "dried milk" shall only be applied to the roduct resulting from evaporation of whole milk or skimmed milk containing not ore than 8 per cent of water. It shall not be permissible to designate the article being the product of whole milk unless it contains at least 23 per cent of butter-fat. ried milk may be treated with an addition of cane-sugar and bicarbonate of soda, or ure sodium hydrate in a quantity corresponding to 0.4 per thousand sodium oxide Na_2O) at the highest.

§ 13.

An article consisting of cream which has been subjected to sterilisation and homoenisation may, besides the designations mentioned in § 5, be provided with the esignation "export-cream", for instance, cream No. 3 (export-cream), but the word xport-cream shall in such case be printed in letters of the same size and type as ose which indicate the kind of the cream.

§ 14.

Milk or cream from other animals than cows shall be designated accordingly.

§ 15.

Victuals containing any other fat substance than butter-fat shall not be offe[r]
for sale under designations in which the terms milk or cream are included unl[ess]
authorised by the Minister of Justice.

Page 163, section 2, 3rd line: instead of "hydrophoby" read "hydrophobia

Page 164, section 7, 4th line: instead of "rachitis" read "poliomyelitis".

Prof. Christian KELLER: *Care of the Mentally Deficient in Denmark.*

Page 233, 5th line: instead of 3,450 read 3,500.

Page 233, 19th line: instead of 1,275 read 1,325.

Page 233, 23rd line: instead 1,400 read 1,450.

Page 235, section 6, 1st line: instead of 3,450 read 3,500.

Page 235, section 6, 7th line: instead of "668 applicants" read "about 400

Page 235, section 6, 8th line: instead of "about 500" read "250".

Oluf J. SKJERBAEK: *Child Welfare in Denmark.*

Page 251, VII, should read as follows: "The rules relating to the employment
children and young people have now been consolidated in one Act, No. 145 of Ap
18th, 1925 (for further information see the remarks on pages 268-269)."

Page 252: The figure for 1921 contained in the table should be 4,687.

Page 252: The number of children under care of the Child Welfare Counc
being brought up away from their homes was at the end of:

1923	4,465
1924	4,668

Page 253: The number of Licensed Reformatories is now 13, with accommodati
for 559 children.

Page 253: The number of Industrial Schools is now 7, with accommodation f
476 children.

Page 254, line 2: The number of Children's Homes licensed to provide for t
wards of the Child Welfare Councils is at present 114, with accommodation for 2,7
children.

Page 254, line 2 from the bottom: There are at present 48 licensed Detention omes, with accommodation for 1,225 children.

Page 256: The aggregate number of Child Welfare institutions (day nursery ork) is at present:

2 Day Industrial Schools.
33 Recreation Homes for children of school-age in the capital.
8 Recreation Homes for children of school-age outside the capital.
62 Public Kindergartens and Infant Schools in the capital.
85 Public Kindergartens and Infant Schools outside the capital.
13 Crèches and Day Infant Homes in the capital.
13 Crèches and Day Infant Homes outside the capital.

The parliamentary grants to Child Welfare institutions (day nursery work) at resent amount to 450,000 kroner. The aggregate expenditure of the State for ublic Child Welfare work has, according to the national accounts for 1924-25, mounted to 4,209,200 kroner. The grants for Child Welfare work are now entered n the budget of the "Socialministeriet" (Ministry for Social Work).

Page 258, lines 3 and 9: The number of Children's Homes which are not licensed receive wards of the Child Welfare Councils is now 39. The number of non-licensed etention Homes is 22.

Page 267, line 3 ff: The supervision of children has been transferred to the hild Welfare Councils in 240 boroughs and parishes, which number 1,380. The ermission to transfer the supervising work from the municipal or parish council the Child Welfare Council is now given by the "Socialministeriet". In one unicipality only (Aarhus) is the supervising work in the hands of the local Health ommittee.

Pages 268-269, VII: The provisions relating to the work of children and young ersons are now consolidated in one Act, No. 145 of April 18th, 1925. Section 1 of this ct provides: "It shall not be lawful to employ children who have not completed ieir fourteenth year and have not been lawfully discharged from school in any rofessional trade or activity apart from farming, forestry (including gardening), iipping and fishing trades."

Section 2 of the Act contains further provisions regarding prohibition of night ork for people below eighteen years of age. According to these provisions, it shall ot be lawful under ordinary circumstances to employ young persons under eighteen ears of age in handicraft, industry and transport in the hours between 6 p.m. and a.m. Should special conditions prevailing within a certain trade render it desirable iat the trade in question be allowed to employ young persons below eighteen years f age after 6 p.m., or in case it is considered necessary for the professional training f the young person in question, dispensations for such employment may as an xception be given by the Minister for Social Work.

Young people may not be employed on work in shops, places where goods delivered, warehouses, auction-rooms and the like before 6 a.m., nor after the eveni hour from which the premises in question shall be closed to the public. In the t months authorised by law for remnant sales it is, however, permissible to empl young people in common with the trained staff in the necessary clearing-up wo marking of goods and the like — however, not later than 10 p.m.

According to § 4, it shall not be lawful to employ young people under eighte years of age for a greater number of working hours than adult employees in same trade, and under no circumstances for more than ten hours a day. The lat limitation shall, however, not apply to shops and the like on days preceding a pul holiday and days for which a special later closing hour has already been fixed, well as the remnant-sales months.

For trades which, according to § 1 of the Act, are exempt from the provisio of the Act, rules may be laid down in special by-laws for individual municipalit regarding prohibition or restriction of employment of children who have not co pleted their fourteenth year *and* who have not been lawfully discharged from scho as well as the restricted employment of young people between fourteen and eighte always provided that the scope of the Act shall not be exceeded.

Page 270: The Act of May 10th, 1912, has from January 1st, 1925, been placed by the Act relating to the keeping of refreshment-rooms, inns and restaura and the sale of intoxicating liquors, No. 99 of March 29th, 1924. According § 32 of this Act, it shall be unlawful in restaurants and inns to serve or have serv intoxicating drinks (*i.e.*, containing more than 2 $^1/_4$ per cent of alcohol) to perso who have not completed, or cannot be considered to have completed, their eighteen year. In a shop selling intoxicating liquors, or in a co-operative store where su liquors may be had, it shall be unlawful to deliver same to persons of the abo mentioned age if there is reason to presume that they are ordering these liquors their own consumption.

Page 271, line 1 ff: The responsible age as regards crime is fourteen, but bill recently submitted to Parliament for a new general criminal law contains proposal to fix this age at fifteen years.

Dr. I. P. Chrom: *The Sanitary Organisation of the City of Copenhagen.*

Page 297, XII: The supervision of boarded-out children is not any longer un the Health Committee but under the Third Division of the municipal Administratio consequently, the personnel dealt with on page 297, section XII, and page 3 § 3, are now under the said Third Division.

Budtz Jörgensen: *Dental Treatment of School-Children in Denmark.*

Pages 348-352: Regarding the alterations made in dental treatment of scho children in this country in the past year I shall only mention that on November 1 1924, a new clinic was opened in Copenhagen at Noerrebro (*confer* page 351, li 2 to 8).

The staff of this clinic consists of five dentists, four dental nurses and a woman endant.

The systematic dental treatment has comprised the three lower classes of the ools of the district.

NUMBER OF CHILDREN TREATED.

umber of children in the three lower asses of the schools	Number of children systematically treated	Number of sick and absent children	Number of children who for various reasons have not completed the treatment
8,646	8,237	252	157

Summary of Systematic Treatment from November 1st, 1924, to August 1st, 1925.

Number of working days	Number of children	Fillings	Extraction of		Other treatments
			Permanent teeth	Temporary teeth	
178	8,237	23,706	491	2,048	2,166

Summary of Emergency Treatment of Children of a more advanced Age.

Number of children	Extraction of teeth	Fillings	Other treatments
2,039	1,899	1,889	1,559

Among "other treatments" are included 2,028 local anæsthetics, 117 X-ray liographs, 22 regulations of teeth, besides 5 pivot-teeth.

In all, 33,758 treatments of various natures have been performed, comprising 595 fillings.

ul SÖRENSEN: *The Water Supply of Copenhagen.*

Page 368: To be added to the table the following two lines:

1923-24	581,500	27,390,000	74,900	116,400	128.7
1924-25	583,200	29,058,000	79,600	100,000	136.5

Page 368, section 3, 4th line: instead of 127.2 read 136.5.

Page 368, section 3, 5th line: instead of 50 litres read 58 litres.

Page 368, section 3, 5th line: instead of 18.2 read 19.5.

Harald WESTERGAARD: *The Alcohol Question in Denmark.*

Page 395, section 1, 11th line: instead of "with about... individual" r "with about the same quantity consumed per individual every year".

Page 395, section 1, 12th line: instead of "is" read "was".

K. A. KNUDSEN: *Physical Training in Denmark.*

Pages 398-404: There are in Denmark two large organisations for ga and exercises.

The one organisation, "De danske Skytte- og Gymnastikforeninger" (Da Rifle Corps and Gymnastic Society), was founded in 1861 with the object of viding a kind of preparatory training for young men prior to commencing t military service in the army, and partly for the maintenance of efficiency in shooting on the part of those who have completed their military service. Shoo was thus the first sport to be exercised in these institutions, the name of which tinued up to 1919 to be "De danske Skytteforeninger" (Danish Rifle Corps); in the latter part of the sixties gymnastics were included and this branch develo considerably, so that in 1920 the name was altered to "De danske Skytte- og G nastikforeninger", as above indicated and women were admitted. In 1924, total number of members amounted to 95,000, of whom about 58,000 were act and some 37,000 passive members (subscribers). The majority of the members countrymen, mostly agriculturists, so that this organisation may be describe a rural organisation for sports, etc.

The other organisation is the "Dansk Idræts-Forbund" (Danish Sports Uni whose 80,000 active and passive members are mostly recruited from the to and it may therefore be described as the sports organisation of the towns. It sho however, be said that of later years the demarcation between town and countr this respect has not been so sharp as formerly. The "Dansk Idræts-Forbun comprises all branches of sports, and each branch has its special union — one football, one for swimming, athletics, rowing, fencing, gymnastics, etc. Wi these special leagues the members are again divided into clubs, of which there in all about 800. Football claims the largest number of active members, alone in this special league there are 274 clubs. There are 115 athletic clubs 65 gymnastic clubs.

Ammon ANDERSEN: *School for Children of Weak Sight.*

Page 423, section 2, 5th line: instead of "Fælledvej 12" read "Sct. H Torv 28".

Dr. TRYDE: *The Hospitals in Denmark.*

Page 429, section 2, 11th line: instead of "185 cubic metres" read " cubic metres".

Page 429, section 2, 13th line: instead of "61.8 cubic metres" read " cubic metres".

andardisation of Sera, Serological Reactions and Biological Products:

- REPORT ON THE INTERNATIONAL CONFERENCE ON THE STANDARDISATION OF SERA AND SEROLOGICAL TESTS convened by the Health Committee of the League of Nations and held from December 12th to 14th, 1921, at the British Ministry of Health, London. (French and English texts.) (C. 533. M. 378. 1921. III.) . . . . . 1/6 [illegible]
- REPORT ON THE SECOND INTERNATIONAL CONFERENCE ON THE STANDARDISATION OF SERA AND SEROLOGICAL TESTS, convened by the Health Committee of the League of Nations and held from November 20th-26th, 1922, at the Pasteur Institute, Paris 1/- $0.25
- REPORT ON SEROLOGICAL INVESTIGATIONS, presented to the Second International Conference on the Standardisation of Sera and Serological Tests held at the Pasteur Institute in Paris in November 1922 . . . . . 8/- $2.—
- REPORT ON THE EUROPEAN HEALTH CONFERENCE HELD AT WARSAW from March 20th-28th, 1922 1/3 $0.30
- REPORT OF THE TECHNICAL CONFERENCE FOR CONSIDERATION OF CERTAIN METHODS OF BIOLOGICAL STANDARDISATION, Edinburgh, from July 19th-21st, 1923 . . . . . 4d. $0.05
- INVESTIGATIONS ON THE SERODIAGNOSIS OF SYPHILIS. Report of the Technical Laboratory Conference held at Copenhagen, November 19th to December 3rd, 1923. (Two Annexes.) (C. 5. M. 5. 1924. III. - C.H. 148.) . . . . . 3/6 [illegible]

alaria:

- MALARIA COMMISSION: REPORT ON ITS TOUR OF INVESTIGATION IN CERTAIN EUROPEAN COUNTRIES in 1924. (C.H. 273.) 6/9 $1.60
- DEUX RAPPORTS SUR LE PALUDISME EN ASIE MINEURE, EN SYRIE ET EN PALESTINE présentés par le Docteur Ernest Basso (Smyrne) et le Docteur A. Bentmann, Conseiller médical de régence. (C.H. 275.) (In French only.) . . . . . 6/9 $1.[illegible]
- MALARIA COMMISSION: REPORTS ON THE TOUR OF INVESTIGATION IN PALESTINE in 1925. (C.H./Malaria/52.) 3/- $0.70

idemiological Investigations:

- A MEMORANDUM ON THE EPIDEMIOLOGY OF CHOLERA, by Major A. J. H. Russell, M.A., M.D., D.P.H., I.M.S., Director of Public Health, Madras Presidency, India, 1925. (C.H. 339.) . . 1/3 [illegible]
- LE FOYER ENDÉMIQUE DE CHOLÉRA DE ROSTOV-SUR-LE-DON. Étude épidémiologique par le professeur W. Barikine (Moscou) et le Docteur H. Cazeneuve (Genève). (C.H. 395.) (In French only.) 1/6 $0.40
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LEAGUE OF NATIONS

HEALTH ORGANISATION

TUBERCULOSIS STATISTICS[1]

SUMMARY OF THE REPORT

ADDRESSED BY Dr. S. ROSENFELD (VIENNA)

TO THE

HEALTH COMMITTEE OF THE LEAGUE OF NATIONS

APRIL 1925

GENEVA 1926.

[1] " Die Tuberkulosestatistik ", von Dr. Siegfried Rosenfeld (Wien) ; Genf, den 1. April 1925 (C.H. 284. 1925).

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C. H. 284 (1).

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CONTENTS

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FOREWORD

This Summary in English contains the essential parts and the conclusions of
e important report prepared for the Health Organisation of the League of
ations by Dr. Siegfried Rosenfeld (Vienna) on "Tuberculosis Statistics" (C.H. 284),
d published in German ("Die Tuberculosestatistik") on April 1st, 1925.

The object of Dr. Rosenfeld's enquiry was to ascertain the extent to which existing
berculosis mortality statistics can be used as a basis for an international investigation
the causes of the decline of tuberculosis mortality.

Dr. Rosenfeld passes in review the tuberculosis statistics of various countries
d the processes by which their data are gathered, elaborated and presented. His
port gives an estimate of the errors which these processes may have produced in
e statistics and thus enables the research worker to correct these errors and utilise
e data for the study not only of the causes of the variation of tuberculosis mortality
it even of the causes themselves of this mortality.

To indicate the methods which he thinks best to give trustworthy tuberculosis
atistics suitable for research work, Dr. Rosenfeld has illustrated his reasoning by
any concrete examples, drawn directly from official statistics or elaborated by
mself.

It has been, unfortunately, impossible to publish these numerous statistical
ustrations in this Summary, but the index will enable the reader to find them in
r. Rosenfeld's original German text.

I. INTRODUCTION

1. In order to fight contagious diseases with success, their relative importance a the loss of human life which they cause must be known. The losses occasioned tuberculosis have not struck the imagination of the public as the terrible epidem of former times did, because they are more usual. These losses, however, extremely important and make it imperative that the fight against tuberculosis continued with the utmost energy. The following table, which contains a gene review of tuberculosis mortality in the various countries of the world, gives pr of this importance.

TABLE I.

STATES, PROVINCES OR COLONIES	Causes of Death	Period of Observation	Annual Average of Deaths	Rates per 100 Deaths	Rat per 100,0 Popula
		A. Europe.			
Austria (pre-war)	TP[1]	1881–1890	88,460	13.03	38
		1891–1894	86,781	12.79	38
	TBC[2]	1895–1900	88,391	13.46	34
		1901–1910	88,244	13.82	32
Belgium	TBC	1888–1890	11,004	8.98	18
		1899–1900	9,619	7.80	14
		1901–1910	7,856	6.66	10
England and Wales	TP	1881–1890	47,397	9.03	17
		1891–1900	42,622	7.59	13
		1901–1910	39,689	7.56	11
Finland	TP	1881–1890	5,656	12.12	25
		1891–1900	6,758	13.51	26
		1901–1910	8,167	15.67	28
France	TP	1906–1910	72,094	9.55	18

[1] The abbreviation "TP" means Pulmonary Tuberculosis.
[2] The abbreviation "TBC" means Tuberculosis (all forms).

States, Provinces or Colonies	Causes of Death	Period of Observation	Annual Average of Deaths	Rates per 100 Deaths	Rates per 100,000 Population
rmany	TP	1892–1900	109,298	9.33	206
		1901–1910	99,252	8.76	163
Prussia.	TBC	1881–1890	85,750	12.20	301
		1891–1900	72,702	10.38	226
		1901–1910	65,805	9.56	176
ungary	TBC	1896–1900	68,540	13.16	363
		1901–1910	77,012	14.95	383
eland.	TP	1881–1890	10,331	10.16	209
		1891–1900	9,738	11.64	213
		1901–1910	8,942	11.65	202
aly.	TBC	1887–1890	38,621	4.80	129
		1891–1900	38,902	5.25	127
		1901–1910	39,766	5.51	119
etherlands.	TBC	1887–1890	8,462	9.30	188
		1891–1900	8,591	9.60	176
		1901–1910	8,198	9.68	146
orway	TP	1881–1890	2,754	8.30	142
		1891–1900	3,957	11.69	184
		1901–1910	4,375	13.40	190
otland	TP	1881–1890	7,716	10.37	199
		1891–1900	7,160	9.15	169
		1901–1910	6,348	8.30	137
rbia	TBC	1891–1900	5,625	8.94	239
		1901–1910	8,060	12.67	296
pain	TP	1900	23,026	4.29	124
		1901–1910	26,952	5.60	141
witzerland	TP	1881–1890	6,132	10.14	211
		1891–1900	6,094	10.26	194
		1901–1910	6,262	10.57	177

STATES, PROVINCES OR COLONIES	Causes of Death	Period of Observation	Annual Average of Deaths	Rates per 100 Deaths	Rate per 100,00 Populati
B. Asia.					
Ceylon	TP	1881–1890	1,916	2.76	67
		1891–1900	2,707	3.01	83
		1901–1910	3,769	3.41	98
Japan	TP	1886–1890	40,133	4.92	101
		1891–1900	59,803	6.71	140
		1901–1910	73,376	7.28	124
Philippines	TBC	1908–1911	16,710	10.1	302
C. America.					
Argentine :					
Province of Buenos Ayres	TBC	1901–1912	2,324	10.65	148
Province of Tucuman	TBC	1901–1912	242	3.17	83
British Empire :					
Antigua and Barbados	TP	1907–1911	62	6.8	190
Bermudas	TBC	1907–1911	40	11.2	253
British Guiana	TBC	1906–1911	682	7.0	232
Canada : Alberta	TBC	1905			
		1907–1909	165	7.7	64
British Columbia	TBC	1902–1911	215	9.0	72
Nova Scotia	TP	1909–1912	867	11.82	177
	TBC	1910–1913	978	13.1	199
Ontario	TBC	1881–1890	2,531	11.14	124
		1891–1900	2,864	11.54	128
		1901–1908	2,770	9.35	125

STATES, PROVINCES OR COLONIES	Causes of Death	Period of Observation	Annual Average of Deaths	Rates per 100 Deaths	Rates per 100,000 Population
British Empire *(continued)*:					
Grenada	TBC	1901–1913	97	6.70	148
	TP	1907–1911	90	6.3	136
Honduras (British).	TBC	1907–1911	55	5.5	138
Jamaica	TP	1881–1890	1,027	7.34	170
		1891–1900	1,137	7.39	163
		1901–1910	1,270	6.62	146
Newfoundland and Labrador	TP	1901–1914	779	19.23	254
Saint Lucia	TBC	1907–1911	68	6.7	140
St. Kitts, Nevis and Anguilla	TBC	1907–1911	108	9.5	246
St. Vincent	TBC	1907–1911	55	6.9	130
Trinidad and Tobago	TBC	1907–1911	734	9.3	226
ile.	TBC	1906–1910	9,797	9.5	297
	TP	1885–1890	5,996	6.76	232
		1891–1900	7,092	7.97	250
		1901–1910	8,298	8.23	257
sta Rica	TBC	1901–1913	287	3.41	83
iba.	TP	1902–1912	3,313	10.48	165
nited States of America:					
Middle Atlantic States . . .	TBC	1907–1913	45,260	10.5	165
Mountain States	TBC	1906–1913	2,069	14.17	178
North Central States. . . .	TBC	1907–1912	24,097	10.09	144
Pacific Coast States	TBC	1906–1913	5,893	13.43	167
U.S.A. (all together). . . .	TP	1900	55,910	10.35	73
		1901–1909	59,860	10.12	64

STATES, PROVINCES OR COLONIES	Causes of Death	Period of Observation	Annual Average of Deaths	Rates per 100 Deaths	Rates per 100,00 Populat
Colonial Possessions of U.S.A. :					
Hawaii	TBC	1907–1911	294	11.9	187
Panama (Canal Zone)	TBC	1906–1914	301	12.16	375
Porto Rico	TP	1904–1908	1,771	7.4	169
Nicaragua	TBC	1908–1911	227	2.3	420
Uruguay	TBC	1907–1911	1,476	9.4	136
Venezuela	TBC	1905–1909	5,264	9.6	199

D. Commonwealth of Australia.

STATES, PROVINCES OR COLONIES	Causes of Death	Period of Observation	Annual Average of Deaths	Rates per 100 Deaths	Rates per 100,00 Populat
Australia :					
New South Wales	TP	1881–1890	993	7.22	105
		1891–1900	1,045	6.76	83
		1901–1909	1,078	6.79	72
Queensland	TP	1881–1890	474	8.82	147
		1891–1900	438	7.85	93
		1901–1909	388	6.81	73
South Australia	TP	1881–1890	320	7.80	106
		1891–1900	321	7.78	94
		1901–1909	303	7.84	80
Victoria	TP	1881–1890	1,409	9.30	143
		1891–1900	1,480	9.06	125
		1901–1909	1,272	8.37	103
Western Australia	TP	1881–1890	33	5.33	91
		1891–1900	78	4.51	61
		1901–1909	178	6.34	73
New Zealand	TP	1881–1890	495	8.41	87
		1891–1900	559	8.12	79
		1901–1909	582	6.79	59
Tasmania	TP	1881–1890	96	8.41	74
		1891–1900	124	6.06	78
		1901–1909	116	5.95	65

The fact that figures are lacking for Africa does not mean that that continent s free from the disease. All the countries of the globe, from the coldest to the hottest, uffer from tuberculosis, and the fight against it is of world-wide importance. The umber of people dying each year from tuberculosis in Europe alone exceeds one aillion.

The proportionate mortality from tuberculosis varies in the different countries f Europe from one-seventh to one-fourteenth of the total mortality. In America, here statistics are less reliable, the difference between these two extremes is still reater.

The proportion of deaths from pulmonary tuberculosis is decreasing in England, cotland, Belgium, Australia, New Zealand. The decrease is also shown by the rates f mortality per 100,000 inhabitants. In comparing the average tuberculosis mortaty of two recent decades (1881-1890 and 1901-1910), it will be seen that the countries numerated in the following table show a decline.

TABLE II.

Rates of Tuberculosis Mortality per 100,000 *Inhabitants (Yearly Decennial Average).*

	1881-1890	1901-1910
Belgium	259	109
England and Wales	173	116
Holland	194	146
New South Wales	105	72
New Zealand	87	59
Prussia	301	176
Scotland	193	137
Switzerland	211	177

Other countries show stationary rates or even increases.

TABLE III.

Rates of Tuberculosis Mortality per 100,000 *Inhabitants (Yearly Decennial Average).*

	1881-1890	1901-1910
Canada	124	125
Ceylon	67	98
Chile	232	257
Finland	255	281
Japan	101	124
Norway	142	190

3. The variations from one country to another or from one year to another in t[he] same country make us wonder whether these rates are really exact and if the da[ta] on which they are based are themselves comparable both in space and in tim[e]. Before being able to use, and draw conclusions from, comparative statistical dat[a] we must look for, estimate and, if possible, eliminate the errors which they ma[y] show. This is true of mortality statistics ; it is still more so of morbidity statisti[cs].

4. Tuberculosis mortality statistics show the same type of error as all mortali[ty] statistics, but they have certain errors of their own. For instance, RAHTS[1] conside[rs] that the deaths from bronchitis are so much more frequent in England than elsewhe[re] that many of them would be ascribed to phthisis in other countries. The sam[e] might apply to various chronic pulmonary conditions of adults and to the ailmen[ts] of new-born babies known as "convulsions, atrophy, congenital debility, etc.[2]

In spite of the fact that the layman is generally able to recognise pulmona[ry] tuberculosis[3], it is difficult to consider as synonymous with "phthisis" the ter[ms] he uses such as "debility, weakness, chronic pulmonary diseases". These sym[p]toms may, indeed, be due to causes other than tuberculosis. The layman is n[ot] able to recognise cases of non-pulmonary tuberculosis.

It is not possible to say, *a priori*, in which way the lack of medical certificati[on] of the cause of death may affect statistics. ROSENFELD[4] and TELEKY[5] believe that [in] Austria the lack of medical certification tends to exaggerate the actual numb[er] of deaths from tuberculosis. KARLSEN[6], on the contrary, thinks that the figures [for] tuberculosis would be doubled if the cases where tuberculosis is a complication [of] infectious diseases in childhood and the cases of senile tuberculosis were included [in] the tuberculosis statistics.

All authors agree that the reliability of registration of non-pulmonary tuberculos[is] is less than that of pulmonary tuberculosis ; the figures for this form of the disea[se] are, indeed, more reliable than those concerning all forms of tuberculosis put togeth[er].

5. There are three main types of error :

1. Those due to the official regulations governing the establishme[nt] of statistics.

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[1] RAHTS : "Die Zahl der Sterbefälle und deren Hauptursachen in einigen Deutschen und ausserdeutschen Städt[en], Stadtgruppen und Staaten" in *Medizinalstatistische Mitteilungen aus dem Kaiserlichen Gesundheitsamte*, IV. Ba[nd], 1897, p. 136.

[2] RAHTS : "Untersuchungen über die Haüfigkeit der Sterbefälle an Lungenschwindsucht unter der Bevölkeru[ng] des Deutschen Reiches und einiger anderen Staaten Europas" in *Arbeiten aus dem Kaiserlichen Gesundheitsam[te]*, XIV. Band.

[3] PRINZING : "Todesursachen in den Europäischen Staaten 1891-1900" in *Statistische Monatschrift*, 1903.

[4] ROSENFELD : "Zur Verbreitung der Tuberkulose in Oesterreich" in *Zeitschrift für Tuberkulose und Heilstättenwes[en]*, II. Band, 1901.

[5] TELEKY : "Die Sterblichkeit an Tuberkulose in Oesterreich 1873 bis 1904" in *Statistische Monatschrift*, 1906.

[6] KARLSEN in "Oversigt over Dödsaarsgerne i Kongeriket Danmarks Bybefolkning 1890-1899 ; Copenhagen 19[..], p. 39. *Idem*, 1900-1909 ; Copenhagen 1914, p. 53.

2. Those due to the imperfection of medical science or practice.
3. Those due to the mode of presentation of the statistics.

These three types may co-exist.

6. Are these errors measurable ? Not with exactitude, but they are to a certain extent : for instance, the modification of the curve of mortality which appears when a factor of error disappears allows one to estimate this factor, supposing that the actual mortality remains constant.

Statistics may not be modified at once by a change in the classification. Custom may have changed before the rules have legalised this change. A change of classification may not bring immediately the expected changes in the rates, because, in reality, conditions may have altered. Such was the case in Austria when the rates of *all forms* of tuberculosis, grouped for the first time for the quinquennium 1895-1900, were lower than those of *pulmonary* tuberculosis alone in the preceding quinquennium, contrary to expectations and merely because tuberculosis was actually declining at the time.

It took several years, in England, to transfer gradually the diagnoses from one to the other of the co-existing designations : " tabes mesenterica " and " tuberculous peritonitis ".

It is therefore necessary to be familiar with the statistics of the past in order that one may understand those of the present in any given country.

In spite of the great difficulties indicated above, it seems possible to determine statistically the influence of the various causes of error and thus to make possible a comparison of tuberculosis mortality statistics both in space and time.

II. INFLUENCE OF OFFICIAL REGULATIONS GOVERNING THE ESTABLISHMENT OF TUBERCULOSIS STATISTICS.

1.

7. The regulations governing the elaboration of the statistics of tuberculosis mo[rtality] differ considerably from one country to another. These rules and regulatio[ns] can be classified in accordance with the answers to the following questions :

(a) Registration of the cause of death :
Who determines the cause of death ?
In what manner is this determination made ?

(b) What are the other rules governing the determination of the causes of dea[th] in general and of tuberculosis in particular ?

(1) Methods of the Determination of the Causes of Death.

8. The causes of death may be determined by :

The attending physician (certificate after treatment) ;
The official medical inspector (medical certificate after inspection) ;
An official non-medical inspector (without medical certificate).

It is quite exceptional that the layman is able to give reliable information abo[ut] the cause of death, and even a medical examination by a doctor without previo[us] knowledge of the patient and without an autopsy has little value. Certificati[on] by the attending physician is undoubtedly the best. The value of the mortali[ty] statistics will depend upon the proportion of deaths medically certified in this fashio[n]. The following general statements are warranted :

(i) The smaller the proportion of non-medically certified deaths, the mo[re] reliable the mortality statistics.

(ii) Statistics are more reliable in the city than in the country ; and also [in] the larger cities than in the smaller ones. At all ages, the proportion of deat[hs] not medically certified is greater among the peasants than among the rest of th[e] population [1].

(iii) Outside the differences existing between the cities and the country, indu[s]trial and agricultural regions, marked variations may be found between one provin[ce] and another in the same State (Austria, Italy, Switzerland). These differences see[m]

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[1] " Ehe, Geburt und Tod in der Schweizerischen Bevölkerung während der zehn Jahre 1891-1900. 5. Teil, *D[ie] Todesursachen* ; Berne, 1916.

o be due to an unequal social and intellectual development (compare, for example, vhite and coloured population of South Carolina) [1].

(iv) The reliability of the statistics varies but slightly with the sex of the deceased.

(v) The reliability varies greatly with the age of the deceased. Medical certiication, which is frequent at adult ages, is less frequent in old age, and still less o in infancy. This should be borne in mind when estimating the reliability of infantile ınd senile tuberculosis statistics, and also in the comparison of mortality from pulnonary and from meningeal tuberculosis, because of the differences in age incidence.

In order that the value of statistics of general and tubercular mortality may be udged, it would be necessary that each State should publish the percentage of the nedically certified deaths in its territory.

(2) Medical Certification of Tuberculosis.

9. It would also be necessary that each State give the percentage of medically ertified tuberculosis deaths. Tuberculosis is more frequently medically certified han most other diseases. Most of the cases diagnosed as "tuberculosis" are really lue to this affection. It is likely, however, that cases of tuberculosis, not recognised ıs such, are hidden under the other headings of the nomenclature when they are ıot certified by a physician.

Medical certification is not uniformly frequent, and it differs in a single country or the different forms of tuberculosis. The physician is not called as often to attend, ınd eventually certify, cases of acute miliary and cases of chronic pulmonary tuberulosis. Moreover, there are cases which the physician alone is able to diagnose uro-genital tuberculosis, for instance). The reliability of the diagnosis in the death ertificates will then vary from one form to another of the disease.

There is no marked difference in the reliability of the diagnosis in the two sexes, nedical treatment being applied with the same frequency in both. On the other ıand, the age of the deceased is of great importance; during the first year of life, nedical treatment is less frequently given than in the following years, and consequently the statistics concerning this first year are not as exact as the others.

The degree of civilisation and the social status have a marked influence upon he mortality rates, as shown by the statistics for the white and coloured population of South Carolina. This makes it very difficult to compare the differences in fatality of tuberculosis in two races.

These observations concerning tuberculosis are in agreement with those previously made about the causes of death in general.

It may be concluded from what has been said above that the different forms of tuberculosis should not be mixed in a statistical comparison, because the exactness

[1] *United States Mortality Statistics*, 1921; Washington, 1924.

of diagnosis in the different forms is not the same. Pulmonary tuberculosis, receiv generally the most exact diagnosis, is the form which lends itself best to comparis

(3) Estimate of the Reliability of Tuberculosis Mortality Statistics wh the Proportion of Medically Certified Deaths is Unknown.

10. In the absence of official data as to the proportion of deaths certified by p sicians, one may roughly estimate this proportion (where medical certification imposed by law) by determining the facilities for reaching a physician in the coun concerned. To do so, the number of physicians in proportion to the population m be known, also the density of the latter and the geographical characteristics of country. This study touches upon the relationship between the incidence of tub culosis and the density of the population, which is a highly controversial subj

11. It has been thought that, tuberculosis being a "dwelling disease", its incide must be related to the density of the population. This relation, although frequen demonstrated, is far from being absolute, probably because of the fact that dwelli in sparsely populated districts are often little suited to the hygienic needs of the in bitants. This relation exists in most of the States of North America, of Austra and in Japan. It is not to be found, however, in Europe, where countries like Belgiu England and the Netherlands, with very dense populations, show unusually low rates tuberculosis mortality. In Finland, Sweden, Norway and Austria, on the other ha the least populated districts have a comparatively higher tuberculosis inciden

12. The pecuniary situation of the population must be taken into considerat when studying the possibility of their having a physician in attendance. The p sicians attached to public medical services or to welfare organisations have not a rule sufficient time to certify carefully the causes of death. Certificates of pers having social or private insurance policies are often falsified in the interest of the insur The exactness of hospital mortality statistics would make it possible, by a comparis with non-hospital deaths, to judge the value of the certificates for the latter if proportion of tuberculous patients dying in hospitals did not vary so greatly from country to another according to hospital facilities. In Austria and Prussia, one-fou of the tuberculous patients die in hospitals, one-ninth only in England.

2.

Consequences of the Lack of Medical Certification on Tuberculosis Mortality Statistics.

(1) *Causes of Death other than Tuberculosis.*

13. Statistics may be affected by the lack of medical certificates of the causes death, by undefined causes of death or by erroneous diagnosis of these caus

l-defined or missing certificates are either classified as such or grouped together ; " Other causes of death ".

In Austria, 37.7 per cent of the deaths were classified under this heading in 1922.

Where medical certification takes place, missing or ill-defined diagnoses may ill be found, but erroneous diagnoses are rare.

4. (a) *Unspecified or Ill-Defined Causes of Death.* — The lack or the vagueness o iagnoses may be studied together, since the statistics of certain countries do not ake any distinction between them. Among the vague diagnoses which might ossibly indicate tuberculosis we find dropsy, heart failure, consumption, cough, etc. uberculosis is not necessarily responsible for the same proportion of medically cer-fied deaths as of the non-medically certified deaths. If all deaths possibly due to iberculosis, among those improperly or insufficiently certified, be classified under ie heading " Tuberculosis ", we would not modify to any great extent, in most ountries at least, the tuberculosis mortality as published in the statistics. It is nly in certain rural districts of Sweden, Denmark, Spain and Italy that the change ould be marked.

It would appear that the diagnosis of tuberculosis is not often overlooked, as the iagnosis is generally easy.

5. (b) *Faulty Certification of the Causes of Death.* — This is the case when the layman rongly calls tuberculosis another disease, or *vice versa.* We may estimate the umber of such cases, on the one hand, by determining what are the actual causes f death corresponding to popular designations, and by determining the frequency f the diagnosis by physicians of each individual cause of death. Both methods ive about the same results.

The layman might " diagnose " as kidney or heart trouble anasarca due to an myloid degeneration of the viscera, following a long-standing tuberculous abscess. he layman will never indicate tuberculosis as a cause of death when it is a compli-ation of an eruptive fever.

The proportion of deaths where there has been no medical attention varies ith the countries. The reliability of statistics will, of course, depend upon this pro-ortion. In the Netherlands, for eleven causes of death the percentage of cases not aving had medical treatment does not surpass 1 per cent ; for convulsions and lcoholism, however, it is 5 per cent. Medical treatment is less frequent for diseases f infancy or of old age than for those in the other periods of life in Sweden, Bavaria, axony and Hungary.

The forms of tuberculosis for which there are no popular names are always iagnosed by a physician, and consequently death statistics concerning these contain ewer errors than the others, save omissions. These omissions are rare if medical reatment and certification of death are frequent. When medical certification of death

2.

is not common, cases of peritoneal, bone, joint and meningeal tuberculosis frequently overlooked.

(2) *Deaths due to Tuberculosis.*

16. Caution must be exercised in comparing tuberculosis mortality in one re with that in another, or of different periods in the same region. It will be necess to consider specified forms of tuberculosis and not tuberculosis in general (all fo and to examine, in the comparison of two regions : tuberculosis death rates ; proportion of cases which a physician alone can diagnose ; the proportion of tu culosis deaths in the age groups where medical certification is the least freq (infancy and old age) ; the proportion of tuberculosis deaths due to the var forms.

17. (a) *Geographical Comparison.*—Switzerland and the Netherlands can be very rea used for a comparative study of tuberculosis mortality, since both countries req death certificates from the attending physician. Next come Italy and Austria, w require medical certificates of death. Then Belgium, France and Germany, w the certificates may be drawn up by laymen. England and the United States scarcely be used for a continental European comparison.

Since medical certification has become more frequent at a time when the oc rence of tuberculosis has been decreasing, we may be quite certain that this decr is real and not the result of a change in the methods of elaborating statistics. Ind tuberculosis mortality seems to have decreased more in the countries where stati are reliable, and increased where they are not yet reliable but are improving. Tu culosis mortality increased *pari passu* with industrialisation (Austrian cities and Jap then it declined.

There is no necessary or constant relationship between medical certification tuberculosis mortality (this is shown by the comparison of the rates in diffe Austrian provinces and also in Italian provinces). This relationship is, howe frequently apparent ; in Styria, the infrequency of medical certification coin with a low incidence of tuberculosis. In Italy, there is a parallelism between frequency of medical certification and that of meningeal tuberculosis and o forms of the disease which only physicians can diagnose.

A comparison of the rates of the different cantons of Switzerland shows the s parallelism.

Neighbouring regions of countries where statistical methods are different s nevertheless, to have similar tuberculosis mortality rates. Such is the case in southern provinces of Holland and in the northern part of Belgium. If there difference between the rates of the eastern provinces of Holland and of North-Wes Germany, this is probably due to the greater industrial development of the la region. In the case of Switzerland, we reach the same conclusions in compa the tuberculosis rates of its cantons with the rates of the neighbouring district

ustria, Italy, France and Baden. The rates are higher in the countries with better atistics — that is, lower in France, equal in Baden and higher in Austria than in ue neighbouring Swiss cantons. Alsace-Lorraine, which possesses an excellent atistical system, has, likewise, an apparently higher tuberculosis mortality than the eighbouring French *départements*, with the exception of Meurthe-et-Moselle.

3. (b) *Comparison of Proportionale Mortality.* — We may also to a certain extent timate the proportion of medically certified deaths by comparing the mortality om the various forms of tuberculosis with the total tuberculosis mortality, or the berculosis mortality at each age-group with the tuberculosis mortality at all ages. his method is based upon the assumption that the diagnosis of tuberculosis is made r certain forms of the disease, or at certain ages of life, by the physician alone. he frequency, apparent in the statistics, of these forms which the layman cannot agnose serves thus as an index of medical certification of the causes of death.

TABLE IV.

9. (i) *Infantile and Childhood Tuberculosis Mortality in Holland.*
(Proportional Mortality (°/₀) of each Age-group.)

Forms of Tuberculosis	Period of Observation	Proportion of Tuberculosis Deaths			
		Under 1 year	1 to 4 years	Under 5 years	5 years and over
		%	%	%	%
ılmonary	1901–1910	1.50	3.09	4.59	95.41
	1911–1916	1.46	2.95	4.41	95.59
	1919–1922	1.56	3.18	4.74	95.26
eneralised	1901–1910	5.08	13.46	18.54	81.46
	1911–1916	4.15	11.94	16.09	83.91
	1919–1922	6.41	15.55	22.06	77.94
bdominal	1901–1910	13.38	12.53	25.91	74.09
	1911–1916	7.45	12.08	19.53	80.47
	1919–1922	4.28	11.05	15.33	84.67
eningeal	1901–1910	17.83	36.27	54.10	45.90
	1911–1916	13.71	35.03	48.74	51.26
	1919–1922	14.18	34.52	48.70	51.30

The decline of abdominal tuberculosis under five years is quite marked ; on other hand, the relative frequency of the three other forms of tuberculosis, at various ages, has remained constant.

If in establishing such tables a comparison is made of proportionate morta of each age for each form of tuberculosis, in different periods and in various count it will be seen that the changes from one period to another are insignificant.

The relative proportions have remained the same in spite of the great eleva of the rates during the war period (1914-1918) and their post-war decline (Sax and Prussia). The post-war proportions in England have changed because the materially reduced the child-population and consequently the absolute numbe deaths of the first age-group. A comparison between the proportional rates of tu culosis of childhood in South Carolina among the white population, where med certification is the rule, and among the negroes, where it is more rare, shows t in the absence of medical certification, the number of cases of tuberculosis is usu under-estimated in the earlier age-groups. We find, in fact, that the proporti rates in childhood are higher among the whites than among the negroes, wher in reality, tuberculosis is much more frequent among the latter. A compariso the same proportional rates for London and for England and Wales in 1871- shows that at this period, when statistics were less reliable than at present, the centage of infantile tuberculosis deaths was lower for the kingdom than it was London, medical certification being more frequent in that city. More recent compari yield much the same results. The same results are also obtained in Switzerland in Italy (comparison of rates of Sardinia with the rest of the kingdom), in Swe Norway and Serbia (comparison between country and cities).

If a comparison is made, in the different countries, of the proportion of de of children under five years from the various forms of tuberculosis, it will be fo that there is slight difference for the forms in which medical certification is freq (meningeal tuberculosis, for instance). It may therefore be concluded that the ferences in the frequency of medical certification have an influence on the rel proportion of tuberculosis deaths in childhood and at the other ages. It is diffi however, to state, *a priori*, in which direction this influence asserts itself.

(ii) Mortality from the Various Forms of Tuberculosis.

20. Swedish statistics give us a comparison of the certain and of the probable noses for the various forms of tuberculosis.

TABLE V.

	Certain Diagnosis (as investigated) Per cent	Probable Diag (as reporte Per cent
Pulmonary tuberculosis	81.42	79.80
Meningeal tuberculosis	9.11	4.57
Tuberculosis of other organs	7.83	5.49
Undefined tuberculosis	1.64	10.14
	100	100

From the above table it may be concluded that one-half of the cases of meningeal tuberculosis are missed because of the lack of medical certification. In the United States, the proportion of deaths from pulmonary tuberculosis is the same for the white and coloured population. Among the latter the proportion of acute miliary tuberculosis is distinctly higher. The reason for this seems to be the fact that there is a larger proportion of children in the coloured population and probably also a racial predisposition to the disease.

If a comparison of these proportions is made in the city and in the country (Sweden), it will be found that in cities the proportion of meningeal tuberculosis is higher, and that of ill-defined tuberculosis lower, than in the country.

The diagnosis of acute miliary tuberculosis requires a long observation of the patient. It is therefore seldom made in the country. In Prussia, miliary tuberculosis appears to be four times more frequent in the cities than in the country, whereas pulmonary tuberculosis is not even twice as frequent.

Swiss statistics show a gradual decrease of the percentage of pulmonary tuberculosis as compared with tuberculosis in all forms, probably because of the increase in diagnoses of the other forms, which the physician alone makes.

In England, on the other hand, the proportion of pulmonary tuberculosis is gradually increasing, because it is being less seldom diagnosed as " bronchitis ", and abdominal tuberculosis is getting apparently less frequent than formerly because the too-comprehensive designation of " tabes mesenterica " is being abandoned.

If we analyse mortality statistics for each localisation of tuberculosis, we find that the proportional rates of the various forms remain practically constant, in the course of normal years, in those countries where statistics are reliable, when, of course, there is no alteration in the classification. The great variations of the proportional rates in Italian statistics are decreasing as the reliability of these statistics increases. This progress is shown by an increase in the rates of bone-tuberculosis, and a decline of those of abdominal tuberculosis and generalised scrofula. The proportion of tuberculosis deaths due to a *pulmonary localisation* since 1910 varies between 63 per cent. in Italy and 86 per cent. in Germany. It should be noted that, in the three countries having the best statistics (Holland, England and Switzerland), this proportion varies only between 72 per cent. and 75 per cent. Other countries differ from this average according to the imperfection of their statistics.

A greater difference exists among the various countries in the proportions of *acute miliary tuberculosis*. They range from 0.85 per cent. in Prussia to 3.19 in Holland. Such a difference cannot be explained by differences in the medical certification alone. " Acute miliary tuberculosis " may have a different meaning in these countries.

The rates of *meningeal tuberculosis* also show a great range of variation from 5.32 per cent. in Japan to 13 per cent. in Norway. Countries with good statistics show average rates of 9 to 11 per cent.

There are great differences in the proportion of *abdominal tuberculosis* from one country to another, the extreme figure of 19 per cent. for Japan being followed by 10 per cent. for Italy, 6 per cent. for England, 5 per cent. for Holland and 4 per cent.

for Switzerland. It is difficult to conceive that differences in the infection c milk consumed in these various countries can bring about such differences in the

Proportional rates of *bone-and-joint tuberculosis* can scarcely be compared one country to another because of marked differences in classification. From cent. in Switzerland, it falls to 2 per cent. in Norway, where statistics are less rel In a general way, it may be said that the rates of these two forms of tuberc vary with the frequency of medical classification.

21. In summing up, it would appear that the lack of medical certification of the c of death gives rise to the following errors in statistics : a decrease in the nu of deaths due to bone-and-joint, miliary, and meningeal tuberculosis and tuberc of other organs ; a slighter diminution of the number of deaths from pulm tuberculosis ; finally, in certain countries, an increase in the number of deaths abdominal tuberculosis and scrofula.

22. In the previous paragraphs we have dealt separately with the effects of th of medical diagnosis of the causes of death on the proportion of tuberculosis d in each age-group and on the relative proportion of deaths from each form of t culosis. We can combine both methods and consider the effect on the proport rates of the various localisations in children under one year.

Table VI.

Percentage of the Various Localisations in Children under One Year.

Country	Period of Observation	Pulmonary Tubercu-losis	Meningeal Tubercu-losis	Abdominal Tubercu-losis	Generalised Tubercu-losis	Oth For
		%	%	%	%	%
Denmark . . .	1920–1922	13.3	63.8	—	11.3	11.
England . . .	1918–1922	12.9	44.9	28.2	11.3	2.
France. . . .	1911–1915	33.6	51.1	—	—	15.
Holland . . .	1911–1916 1919–1922	31.0	48.0	6.9	7.2	7.
Japan	1904–1910	31.5	50.3	13.2	—	5.
Norway . . .	1904–1914 1917–1920	15.6	70.2	2.2	3.3	8.
Switzerland. .	1911–1920	24.7	52.8	6.8	5.1	7.
United States .	1909–1920	32.2	46.2	8.4	7.8	—

Table VI shows that the proportion of pulmonary tuberculosis varies bet 13 per cent. in England and 33 per cent. in France. The average is about 30 per

The average for meningeal tuberculosis is about 50 per cent., the maximum for this form being 70 per cent., in Norway. The English rates make quite a contrast with the average, showing an unusually small proportion of pulmonary tuberculosis and a very high one of abdominal tuberculosis. This latter diagnosis seems to be used in England with undue frequency, and this error has an effect on the other relative rates. In London, where statistics are more reliable than in the rest of the country, proportions approach more closely those of the other countries.

23. From the preceding remarks, we may conclude that, if the comparative lack of medical certification of death has an influence on statistics, this influence is not always constant, nor is it sufficient to explain all the differences between the various countries. It does not even seem to be the main factor of these differences.

3.

Consequences of the Lack of Confidential Death Certification.

24. In the preceding pages we have assumed that the physician is always scrupulous in making out his certificates of the causes of death, but this is not always the case, and tuberculosis statistics are a proof thereof.

When notification of the cause of death is not confidential, the physician may, even outside of any unintentional mistake of diagnosis, indicate a different cause from the one he knows to be true. He may do so out of consideration for the memory of the deceased, or of his family, or in order not to hurt his own reputation by admitting an error of diagnosis. The latter cause of error must exist especially in the countries where social insurance systems are developed ; the physician who for years has treated an insured person for a so-called "chronic bronchitis" dares not retract his first diagnosis, and the cause of death on the certificate figures as such. The system of compulsory insurance having been created (1883 in Germany; 1888, Austria; 1891, Hungary; 1901, Luxemburg) before the era of reliable tuberculosis statistics (1904 in Germany), it is not possible to estimate the effect of the introduction of this system upon statistics. One cannot, even without prejudice, fail to see that the development of the system of health-insurance in Austria was accompanied by a decrease in the number of deaths ascribed to tuberculosis, and by an increase of the number of cases due to inflammatory diseases of the respiratory organs. This change is particularly evident in the industrial districts, where insurance was most common. In Prussia, the facts are identical ; after the introduction of the insurance system in 1887, and especially since 1890, the rate of tuberculosis has declined, whereas the rates of "tracheitis, bronchitis, pneumonia and pleurisy" have risen. The phenomenon was especially obvious among the males and at the adult ages from 30 to 60, that is, precisely in the class of the population benefiting by the insurance system.

At that period (about 1890) the decline, apparent in Germany and Austria, was not felt in the countries (England, Scotland, Holland, Switzerland and Italy) which had not then developed any social insurance system.

In France, in cities with more than 30,000 inhabitants, a decline in the ra tuberculosis mortality was also felt among males between 20 and 30 years o but without a corresponding increase in the rates of chronic bronchitis, as in P and Austria. There was no change in either Switzerland or Italy at the same p In England, there was no increase in chronic bronchitis rates.

Experience in the above-mentioned countries shows that health-insuranc tems have proved to be a cause of error in the tuberculosis statistics. It is not *neces* so, however. The Swiss method of death registration, by preserving complet fessional secrecy, allows the physician to give exact statements to the stati registration office It is essential, in order to obtain exact statements, and consequ exact statistics, to make medical certificates of death confidential. In Switze the introduction, followed by the generalisation, in 1901, of the confidential sy has raised the number of cases called " tuberculosis " considerably and produ marked decline in the number of so-called " chronic bronchitis " cases. Since the rates of both diseases have gradually declined. The same phenomenon woul bably occur in any country adopting a confidential system. In England, whe medical notification of the causes of death are, so to speak, public, the rate for chitis is abnormally high, probably because many cases of pulmonary tuberc are included under the heading " bronchitis ".

It is quite vain to think that the confidential system can be dispensed replacing it by passing laws to penalise the authors of false statements. Physi can always claim to have made a mistake in the diagnosis.

4.

Consequences of Enquiries made to Practitioners to ascertain the E Causes of Death.

25. There exist, in some States, regulations which may increase the exactn the data contained in death certificates, outside, of course, of the medico-legal aut or analyses, and even of the inquest cases which take place in England when the of death has not been certified by an attending physician (tuberculosis was fou be the cause of death in only 2.4 per cent. of these inquest cases instead of 10 per in the normally certified deaths).

In Austria, the official physician, in Switzerland and Italy, the Central B of Statistics, can exact from the physician who made the certificate, additional or the precisions of the diagnosis when the latter is ill-defined. The same is of England and the United States. These two countries even publish the da this complementary information. In England, the proportion of these enq fell from 2 to 1 per cent. of the deaths, and nearly 90 per cent. of these enquiri answered satisfactorily by the physicians. The number of deaths which are asc to tuberculosis after additional information has been obtained reaches 0.5 per only of the total number of tuberculosis deaths. One of the advantages of this tional information is that it indicates under which fallacious names cases of tuberc

may be hidden. Rosenfeld has calculated, on the basis of this complementary information in England and America, that, to the number of cases of tuberculosis published in the statistics, a co-efficient should be added as follows :

3.2 %	of	the	published	figure	for	tuberculosis (all forms)
2.2 %	,,	,,	,,	,,	,,	pulmonary tuberculosis
7.5 %	,,	,,	,,	,,	,,	meningeal tuberculosis
5.4 %	,,	,,	,,	,,	,,	abdominal tuberculosis
4.8 %	,,	,,	,,	,,	,,	generalised tuberculosis.

This figure of 3.2 per cent. shows how important the result of this system of additional information is in the case of tuberculosis. It requires, however, a permanent, active and centralised statistical office, and the education of physicians on the necessity of exact certification of the causes of death.

5.

Consequences of the Definition of Tuberculosis and the Limitations of its Field.

26. Many affections which, in the past, were held as distinct from tuberculosis and not included under this heading have gradually become classified as such. It is essential to take into account this progressive widening of the field of tuberculosis. At first it only contained pulmonary tuberculosis. Papavoine, in 1830, annexed to it " hydrocephalus acutus ". For a long time the Viennese school distinguished " phthisis " and " tuberculosis " ; " phthisis " then included many non-tubercular affections. Definitions varied from one country to another and from one period to another. It was only after the discovery of the Koch bacillus, in 1882, that the statistics became homogeneous, and, even then, only after the physicians had become used to the idea about 1890. The rates of tuberculosis mortality in England, Switzerland and Austria were not modified by Koch's discovery. This discovery did not give an absolute limit to the field of tuberculosis. Certain affections, even now, have still an obscure relationship with tuberculosis. Such is the case, for instance, of certain forms of choroiditis, of Hodgkin's disease, which was, until 1920, coupled with leukœmia, and which is perhaps a tuberculosis of the lymphatic glands. Strange to say, lymphadenia was included under the heading of scrofula until 1880. Scrofulous diseases were, for a long time, distinguished from tuberculosis (Bajinsky made the distinction until 1913). At the present time, by scrofula we mean " lymph-gland tuberculosis ", but no longer, as formerly, tuberculosis of the bones or joints. The number of deaths ascribed to scrofula has decreased progressively, but noticeably, in countries like England, Switzerland and Italy, which have maintained this heading. This decline can be explained by the change in the medical conception of the diseases classified under this heading.

Lupus was considered as tuberculous several years only after Koch's disco
It was formerly included among cancers under the name of " ulcus rodens " (a
present time lupus forms about one-thousandth of the deaths from tubercul

Addison's disease may be considered in most cases as a tuberculosis of the adr
(it represents 2 per 1,000 of the number of deaths from tuberculosis).

Abscesses of the psoas muscle and retro-pharyngeal abscesses are nearly al
the result of tuberculosis of the vertebræ and should be classified as such.

As the previous paragraphs show, classification of the causes of death dep
upon medical science and the knowledge of practitioners. No national regula
or international recommendations may standardise the statistics before the pr
tioner has become acquainted with the new scientific facts.

6.

Classification of the Causes of Death.

27. (1) *Classification considered from the Purely Formal Standpoint.* — In
to have complete statistics of tuberculosis mortality, the Central Statistical O
of each country should publish, every ten years, an exact and detailed nomencla
of the affections included under the heading " Tuberculosis ". This det
nomenclature is necessary to the elaboration of an abridged nomenclature.

In order to facilitate international comparison of mortality statistics, an i
national commission met in Paris in 1900 and elaborated a detailed and an abri
nomenclature or list of causes of death. These nomenclatures, revised in 1909
1920, have unfortunately not been adopted yet by all countries. Some use a
detailed, others a more sketchy, nomenclature. This is very unfortunate.

There is no doubt that tuberculosis statistics included in the past many d
which were not due to this disease (this is becoming more rare as statistics b
themselves). We can give instances of this fact :

In Holland, until 1887, diabetes and pulmonary tuberculosis were coupled u
the same heading. Five per cent. at least of the cases thus called " tuberculo
were indeed diabetes cases.

Until 1887 also, Belgian statistics made no distinction between pulmonary tu
culosis and all other lung diseases (the former making up two-thirds of the to

In Finland, the deaths from whooping-cough are not distinguished from t
of pulmonary tuberculosis, the rate of the latter being thus unduly raised. This ex
may be estimated by bringing into comparison the proportion of mortality f
whooping-cough to pulmonary tuberculosis mortality in other countries, this pro
tion varying from 8 to 17 per cent.

In England, until 1881, the deaths from hydrocephalus were columned an
those from tuberculous meningitis because of the similarity of their name (hy
cephalus acutus).

In Switzerland, until 1900, the heading " bone tuberculosis " included
of " osteitis, periostitis, bone-cary, osteomyelitis, etc. ", without any distinc

being made with regard to their etiology ; in the same fashion, " tuberculosis of the joints " included " acute arthritis ".

There resulted from the abandonment of this method of classification a marked decrease in the number of deaths from " bone-and-joint tuberculosis ".

In Italy, until 1894, tuberculous and non-tuberculous diseases of the bones were also confused.

In Prussia, it was only in 1903 that rickets and scrofula were dissociated and the latter classified as tuberculosis. From this change there resulted a considerable increase of tuberculosis (36.5 per cent.) in the ages under 15, and a decrease of 80 per cent. of the deaths ascribed to " rickets ".

The use of Virchow's pathological classification of diseases according to their localisation, instead of according to their etiology, has prolonged these abuses : through its use, lupus remained classified as a disease of the skin and not as a tuberculous infection, pulmonary tuberculosis as a respiratory disease, and tuberculosis meningitis as a disease of the nervous system. The existence elsewhere in the nomenclature of a separate heading of " tuberculosis " was only adding to the confusion.

No country except England published the total number of deaths from tuberculosis as long as Virchow's system was in use.

28. (2) *Forms of Classification of Causes of Death. International List of Causes of Death.* — A nomenclature of causes of death must be modified in accordance with the progress of medical science. In order to establish a nomenclature, all causes of death must be reviewed and their mutual relationships determined.

We shall consider here, in this light, the established international nomenclature.

Certain items of this classification are homogeneous : others are compounds of several different affections ; this classification is therefore not absolutely detailed.

Certain titles in this classification, sufficiently clear for the physician, are not intelligible to the layman. All the affections grouped under one title should be listed there.

Confusion may, indeed, arise from the composition of each group of the classification without any corresponding change in the title of the group. This means a real alteration of facts and not only a different interpretation of synonyms.

Therefore changes in the composition of the classification—groups and items—ought to be very obviously indicated in the statistical publications themselves.

The titles concerning tuberculosis in the International Nomenclature of Causes of Death of 1920 are the following :

31.	Tuberculosis	of	the	respiratory system.
32.	,,	,,	,,	meninges and central nervous system in general.
33.	,,	,,	,,	intestines and peritoneum.
34.	,,	,,	,,	vertebral column.
35.	,,	,,	,,	joints.

36. Tuberculosis of the other organs (with the following subdivisions

(a) ,, ,, ,, skin and subcutaneous cellular tissue;

(b) ,, ,, ,, bones (vertebral column excepted);

(c) ,, ,, ,, lymphatic system (mesenteric and retr peritoneal glands excepted);

(d) ,, ,, ,, genito-urinary system;

(e) ,, ,, ,, organs other than the above.

37. Disseminated tuberculosis (with the subdivisions : *(a)* acute ; *(b)* chronic).

Observations concerning the various titles of this classification.

Ad 31. — Laryngeal tuberculosis was classified apart until 1920. There no statement about tuberculosis of the bronchial lymph-glands which might be includ there or classified under title 36 *(c)*.

Ad 32. — This title should cover tuberculosis of the spinal cord, which has be omitted in the list of synonyms and might at present be classified as a tuberculos of the other organs 36 *(e)*.

Ad 33. — Tuberculosis of the intestines and peritoneum, formerly abdomin tuberculosis.

Ad 34. — " Tuberculosis of the vertebral column " has replaced the nan " Pott's disease "; Pott's disease being, properly speaking, a tuberculosis of th cervical part of the vertebral column. " Pressure myelitis " ought to have been ind cated here and not placed among the " other diseases of the spinal cord ". The retr pharyngeal abscess and the abscess of the psoas muscle ought to be included he also. and not among the diseases of the throat and of the locomotor system respectivel

Ad 35. — "Tuberculosis of the joints." This title is not quite justified, sin tuberculosis of the joints is nearly always the consequence of bone tuberculosis.

Ad 36. — It is unfortunate that the division of this title into its constituen is not compulsory :

(a) The abscesses are often due to suppuration of the lymph-gland and ought to be also mentioned under 36 *(c)*.

(b) Ought to contain the subdivision " vertebral tuberculosis ".

(c) Contains the former so-called " scrofula " cases.

(d) Ought to include Addison's disease or tuberculosis of the adrenal

Ad 37. — " Disseminated tuberculosis. " This title should include : " amyloï degeneration of the viscera ", which is so often the result of long-standing tuberculou suppuration.

The changes suggested above would not modify markedly the total numbe of deaths from tuberculosis.

Most of the Latin countries and the United States of America use the *Inter national List*. The nomenclatures adopted by other countries are either more or les

etailed than the international one, but they give side by side the various forms of uberculosis (the German Reich, Italy and Switzerland are exceptions to this rule).

Viennese statistics of necropsies show that the clinicians and the statisticians n one side and the pathologists on the other may have different views on what is ssentially the "cause of death" (tuberculosis is given as the cause of death more freuently by the clinicians than by the pathologists). The use of the usual nomenclature hould therefore be required from the pathologists for their post-mortem diagnoses, n order to avoid unnecessary confusion.

29. (3) *Rules of the Selection of the Main Cause from Joint Causes of Death.* — Besides he *International List of Causes of Death*, a set of rules has been given through the roper method of assignment to the preferred title of causes of death ; when two causes are simultaneously reported in the death certificate, seven rules have been laid down or that case.

Unless there is an indication to the contrary from the physician, the following ause will be selected :

1. The primary disease when the other seems to be only a complication of it.
2. The epidemic disease when any of the reported causes is of an epidemic nature.
3. The more fatal disease.
4. The wound, if any is reported.
5. The less common disease.
6. The more characteristic disease.
7. The disease the evolution of which is the more rapid.

The physician alone may truly indicate the relative importance of the simultaneous affections, but, if he does not indicate this relation, the statistician needs to apply definite rules for the tabulation of the causes of death.

Let us now consider how to apply these rules in cases of tuberculosis.

Ad 1. — This rule is not satisfactory because the term "complication" lacks precision and is often erroneously used as a synonym of "late symptoms"; ex. : cold abscesses in Pott's disease. This rule is often broken when cases of diabetes, tabes or hepatic cirrhosis are ascribed to their complication "tuberculosis".

Ad 2. — If an epidemic disease and tuberculosis are reported simultaneously, the death is ascribed either to the former (in case of smallpox, scarlet fever and diphtheria) or to the latter (in case of measles, whooping-cough and influenza). Rule 2 is therefore not literally enforced.

Ad 3. — It will be necessary to establish precise rules of graduation of the various diseases according to their fatality.

Ad 4. — An indication of the physician is essential here.

Ad 5. — This rule has no scientific character ; fatality and rarity are not synonymous.

Ad 6 — Death should be ascribed to the disease which is most exactly define

Ad 7 — The evolution of tuberculosis is usually considered to take one year, wit the exception of the meningeal and the acute miliary forms. If rule 7 were followe tuberculosis would very seldom be considered as a cause of death when secondar to infectious diseases such as measles and influenza, which have a more rapid cours

In England, tuberculosis is considered as a secondary cause, while it is considere as a primary one in the United States of America. When large statistical offices lik those of these two countries may consider in a different way the same rule, ho can the statistics be kept comparable when interpretation lies with local officials Many States, in order to obviate the difficulty, require from the physician the indicatio of the determining cause of death.

III. INFLUENCE OF THE PHYSICIANS ON THE ELABORATION OF THE STATISTICS.

1. Erroneous Diagnoses.

30. We do not deal here with wilful errors in the reports of the cause of deaths, since they have been discussed above, but with unintentional mistakes.

These mistakes may either increase or diminish the apparent number of deaths from tuberculosis. The mistakes most frequently made are the confusion of chronic pulmonary tuberculosis and chronic bronchitis in old people ; of pulmonary tuberculosis and acute bronchitis in children ; of caseous pneumonia and broncho-pneumonia following measles in children ; of disseminated tuberculosis and typhoid fever or cerebro-spinal meningitis ; of tuberculous meningitis with epidemic meningitis ; of intestinal tuberculosis and chronic enteritis ; of tuberculous peritonitis and cirrhotic peritonitis.

The names of symptoms such as "convulsions", "emaciation", "atrophy", may indicate tuberculous or non-tuberculous infections. The same is true of the term "senility".

Diagnostic mistakes are more frequent in the country than in cities ; more in regular outside practice than in hospital practice. Cabot, comparing the clinical and post-mortem diagnoses of 3,000 American hospital cases, considers the former as unreliable : according to him, the diagnosis was correct in only 59 per cent. of the cases of pulmonary tuberculosis and 52 per cent. of those of miliary tuberculosis.

But these percentages seem to be quite under-estimated, because the majority of cases going to autopsy are precisely the doubtful cases.

Confusion of corresponding tuberculous and non-tuberculous diseases is evident in statistics and may be shown by a parallel study of their rates at various periods, following the steps of progress of medical diagnosis. Thus, in Vienna, from 1891-1900, the number of deaths from meningeal tuberculosis was doubled and the number from other forms of meningitis reduced by half ; the number of deaths from non-tuberculous meningitis for 100 from tuberculous meningitis fell from 636 to 158. In all countries (England, United States of America, Holland, Italy, Japan, Switzerland) a similar change took place. The better the statistics the larger the relative proportion of tuberculous meningitis. In France, for instance, it is larger in Paris than in the other towns, and in these larger than in the country. In Sweden also it is larger in cities than in rural districts.

Since progress of medical diagnosis and reliability of statistics are parallel phenomena, the number of deaths reported as due to tuberculous meningitis increases, whilst the number from non-tuberculous meningitis is decreasing. It is impossible to admit that the sensitiveness of human meninges to the tubercle bacillus has increased ; there must have been a replacement of the diagnosis of non-tuberculous meningitis by the one of tuberculous meningitis.

This substitution is less evident for the other forms of tuberculosis. No definit conclusion can be attained by a comparison of the rates of tuberculous and non tuberculous peritonites (including appendicitis).

If in England and in Switzerland the incidence of tuberculous peritonitis i higher as compared with non-tuberculous peritonitis, such is not the case in Italy

The introduction of a new nomenclature of causes of death modifies still mor markedly the proportions of the diseases between themselves. For instance, bette definition of the forms of tuberculosis in Berlin, in 1904, produced a marked apparen increase of this disease in this city, an increase of 50 per cent. of the cases of tuber culous meningitis in one year, a rise also of the rates of pulmonary tuberculosis, an a decline in the incidence of bronchitis, which was reduced by 50 per cent. in age groups between 5 and 40 years. The number of deaths from chronic bronchitis corre sponding to 100 deaths from pulmonary tuberculosis was gradually reduced :

From 9.1 to 6.5 from 1901 to 1915 in the United States of America.
,, 20.6 ,, 18.1 from 1901 to 1922 in Holland.
,, 16.8 ,, 10.7 from 1904 to 1919 in Norway.
,, 24.6 ,, 23.4 from 1901 to 1917 in Italy.
,, 44.4 ,, 24.3 from 1881 to 1920 in Switzerland.
,, 8.3 ,, 6.8 from 1906 to 1915 in Paris.
,, 34.6 ,, 23.2 from 1906 to 1915 in the rest of the French territory.

The proportional rate is higher in the country than in the cities, and higher in th latter than in Paris, the proportion being in inverse relation with the reliability o the certificates of causes of death.

In England the proportion was lowered from 141:100 to 105:100 from 1891 t 1920 ; the proportion remains still higher than anywhere else. In this country th death rate from acute and chronic bronchitis is extremely high and makes a shar contrast with the extremely low tuberculosis mortality. As a rule, in countrie where the mortality from bronchitis is high, pulmonary tuberculosis shows, on th other hand, a low mortality, and *vice versa*. There must be, therefore, a transfer i the diagnosis from one group to another, an error intentional or not ; for environ ment, climatic or professional conditions cannot be held solely responsible for th differences, if they are at all responsible.

This was the conclusion of an enquiry made by an official Dutch commission which studied in 1918 the Belgian and Dutch statistics of tuberculosis from this poin of view.

There exists a certain balance between the number of deaths from bone tuber culosis and from other diseases of the bones ; there has been an increase of the forme to the detriment of the latter in Italy since 1904 ; also in England, where the former from 1901 to 1910, increased from 1,146 to 2,188, while in the meantime deaths fro other diseases of the bones fell from 762 to 66.

The same compensatory balance is also shown by Swiss statistics since 1901.

From the preceding paragraph we may conclude that tuberculosis statistics cannot be properly interpreted without taking into account the statistics of the non-tuberculous affections, corresponding to its various forms. We must always consider at the same time the figures of mortality for the corresponding tuberculous and non-tuberculous forms of the diseases and state, for instance, a decline of the mortality from pulmonary tuberculosis only in case we find at the same time a decline in the mortality from chronic bronchitis. There is no doubt that medical diagnosis is gradually becoming more perfect, and that statistics are deriving greater precision from this fact.

2. Ill-defined Causes of Death.

31. The ignorance of the exact diagnosis may bring the embarrassed physician to use as a diagnosis simply the name of one of the symptoms of the disease. This kind of diagnosis may result not only from the embarrassment of the physician but very often from his neglect. Among these ill-defined diagnoses we find, concerning tuberculosis, the following : emaciation, debility, consumption, cachexia, rickets, anæmia, infantile convulsions, senility.

Ad 1. — These terms are frequently used by laymen to designate pulmonary tuberculosis. The main difficulty lies in the distribution of these cases among the various subdivisions of the heading "Tuberculosis".

The diagnoses "atrophia" and "senility" are getting more and more abandoned (passing from 20,372 in 1901 to 6,734 in 1919). The same is happening with the "pædatrophia" in Holland.

Ad 2. — It is very seldom that rickets is a real cause of death. It may be only a predisposing factor of the tuberculosis. This diagnosis is used less and less as a cause of death (3,539 in 1900, 2,362 in 1914 in Italy ; 1,124 in 1890, 512 in 1920 in England).

There are irregular variations in the rates of these causes in Switzerland, probably due to the fact that cases of "scrofula" are mixed with those of "rickets".

Ad 3. — Some cases of tuberculosis may be hidden under the name of "anæmia", but they cannot be numerous.

Ad 4. — It is quite likely that many cases of meningeal tuberculosis are covered by the title of "infantile convulsions". This diagnosis fortunately tends to disappear, passing from 22,222 in 1891 to 4,522 in 1919 in England, and from 20,000 in 1890 to 12,400 in 1917 in Italy, and having declined by one-half in Switzerland and in Holland. This decline is obviously due to better diagnoses.

Ad 5. — The term "senility", which undoubtedly covers many cases of pulmonary and bone tuberculosis in old people, after being used gradually more and more in England, in Switzerland and in Italy, tends now to be abandoned in the first

two countries. This increase, in Italy, cannot be entirely explained by the extensio of duration of life in that country.

Thus, with the exception of the diagnosis of " senility ", all the ill-defined cause of death which could cover cases of tuberculosis are gradually falling into disus probably through the betterment of diagnoses.

Among the deficient diagnoses we may still indicate: meningitis, pleurisy pericarditis, peritonitis, etc., without further precision. The physician should b required to complete his diagnosis by adding a mention such as " tuberculous " o " non-tuberculous ".

3. Physicians and Statistical Regulations.

32. After having established an exact diagnosis of the causes of death, the physicia may still make mistakes in the designation of these causes through ignorance or lac of comprehension of the administrative regulations concerning the use of titles of th nomenclature. Physicians, therefore, should be trained, in view of their function and responsibilities, towards statistics.

It is sometimes very difficult to ascribe to a specific disease a death which i a consequence of the deterioration of several organs by past affections. The work of Lubarsch, Bartel, Beitzke, Burckhardt and Naegeli in the past, and thos more recent of Hirschowitz, have shown in which cases tuberculosis should be con sidered as the main, and in which others it should be considered as a contributory cause of death. Tuberculosis is nearly always the main cause of death when it i indicated as the secondary cause.

Swiss statistics mention all cases, in which tuberculosis is indicated as a cause whether primary or secondary. In 1.65 per cent. of the total number of deaths tuberculosis seems of great enough importance to be indicated as a contributory caus We may therefore well conceive how embarrassed the physician will be when he i allowed to indicate only one cause of death. To do away with these embarrassments it has been found necessary to distinguish among the simultaneous causes of deat the direct and indirect, the primary and secondary, the initial and consecutive, th main and the simultaneous causes of death.

The central statistical offices may in some measure rectify these errors of th classification of death certificates.

The International List of Causes of Death indicates tuberculosis as a complicatio to only three diseases: diabetes mellitus, tabes and hepatic cirrhosis. In reality tuberculosis is a frequent complication of childhood infections like measles and whoop ing-cough, and also very frequently a complication of mental diseases.

In Prussia, for instance, tuberculosis kills in the asylums one-third of the imbecile and 16 per cent. of the total number of the inmates. In England, if the initial menta disturbance were indicated as a cause of death of the people dying from tuberculosi in the asylums, this change of certification would reduce by 6 per cent. the tuberculosi death rate in the country, this reduction bearing mostly on acute phthisis and miliar tuberculosis.

In the United States (United States Mortality Statistics 1918) 140,144 deaths were ascribed in 1917 to tuberculosis as the principal cause of death and 16,341 (11.5 per cent. of the last figure) are ascribed to other diseases, but having tuberculosis as a contributory cause.

There are cases where tuberculosis, indicated as a mere clinical complication, is tabulated on the statistics as the main affection.

It must be noted that, in trying to determine tuberculosis morbidity, we run the risk of diminishing arbitrarily the morbidity of other diseases like diabetes mellitus, for instance, because of the frequent simultaneous presence of both these affections.

The statistician must not classify blindly, according to set rules, the various causes of death given simultaneously in the certificates. In the combination of diabetes and tuberculosis, the one and the other of those two diseases may be the main cause, or the associated or contributory cause. The tabulation must vary therefore with individual cases. If, in the United States of America, all deaths for which tuberculosis is reported as a contributory cause were classified as tuberculosis, this would increase the general tuberculosis death rate by 1 per cent. only ; on the other hand, this rate would be reduced by more than one-seventh (15 per cent.) if deaths having a non-tuberculous contributory cause were eliminated from the number of tuberculosis deaths.

In England, the same affections are tabulated on different principles, and tuberculosis is given as a secondary cause with the infectious diseases like measles, whooping-cough, diphtheria, influenza. In English the words " primary " and " secondary " indicate the relative importance of the diseases, whilst in German " primäre " and " sekündäre " indicate only the mode of succession. This difference shows the need of an agreement and the necessity of establishing a rule for the selection and tabulation as a cause of death, either the essential or the initial disease. After an agreement has been reached, physicians should be informed of the decision, and their individual judgment would prevent further errors in the future.

The Swedish, Italian, Dutch, Japanese and English statistics show a distinct co-variation between the number of deaths from whooping-cough and measles and from pulmonary and meningeal tuberculosis under five years (in England, this parallelism exists only with tuberculosis of the first year of life). This parallelism shows the narrow relationship between measles and whooping-cough, on the one hand, and tuberculosis on the other. It explains partly the decline of infantile tuberculosis by a better protection of the infants against infectious diseases. The relationship between tuberculosis and influenza is of the same kind. With the influenza epidemics in 1889-90, 1900, 1917-18, the rates of pulmonary tuberculosis have increased markedly. They fell back to their normal level after the epidemics. The parallelism between the rates of these infectious diseases and of tuberculosis clearly indicates that cases of associated infections are classified indifferently, or nearly so, either as tuberculosis or as infectious diseases.

IV. ELABORATION AND PRESENTATION OF STATISTICS.

1. Medical Bases of Statistics.

33. The only reason for the elaboration of statistics is to further medical scienc and also the practice of medicine, in showing the result of hygienic measures and i giving to the theory of medicine a mass of observations in which the contingencie of individual cases are lost, and in opening new fields of study.

Certain clinical localisations of tuberculosis cannot be considered as real cause of death. Such are: the tuberculosis of the eyes, of the ears, of the nose, of th mouth, of the bladder, of the skin (except lupus), because they are always secondar to another localisation and because they do not involve any organ essential to lif Other localisations may occasion death only through a long-standing suppuratio bringing about amyloïd degeneration of the viscera.

We know now that tuberculosis is hardly acquired otherwise than through th alimentary tract (in childhood especially) or through aspiration into the lung. I most cases, and with the exception of primary intestinal and alimentary tuberculosis a pulmonary affection (bronchial lymph-glands) is the origin of other localisations We might therefore be justified in considering, for all tuberculous deaths, pulmonar tuberculosis as the primary cause.

Meningeal and acute miliary tuberculosis present very close relationships fror the clinical standpoint. In practice, distinction of the localisation as the cause c death is of little importance, if these various localisations follow the same course an originate from the same source of infection. Likewise, there is no need to distin guish joint or vertebral tuberculosis from bone tuberculosis, of which these constitut forms. It is vain to distinguish intestinal tuberculosis from peritoneal or mesenteri tuberculosis. Statistics might limit the forms of tuberculosis to the following:

1. Acute miliary tuberculosis.
2. Meningeal tuberculosis.
3. Tuberculosis of several organs.
4. Tuberculosis of the respiratory organs.
5. Abdominal tuberculosis.
6. Tuberculosis of the lymph-glands (scrofula).
7. Bone-and-joint tuberculosis.
8. Lupus.
9. Bladder and genito-urinary tuberculosis.
10. Tuberculosis of other organs.

The infection takes place in the beginning of life, and the proportion of infecte individuals increases with age. One generally admits that the primary infection which causes the high tuberculous infantile mortality, brings about — if it doe not prove fatal — immunity against re-infection.

34. *Specific Rates of Tuberculosis Mortality.* — Tuberculosis mortality varies with the factors of development in the body of Koch's bacillus. It varies therefore *according to sex* unless the individuals of both sexes partake exactly the same life (industrial, agricultural life). The localisation of tuberculosis is not identical in both sexes. Females, for instance, present more frequently than males abdominal and cutaneous localisations (lupus) and more seldom the pulmonary forms (in Holland, England, United States of America). In Italy the female rates for all forms are higher than the male, except those for the meningeal and the bone localisations. It is therefore necessary to distinguish rates by sexes, not only for the sum of all tuberculosis but also for each individual localisation. The statistical data, thus detailed, will make possible medical researches on all the states of local minor resistance, causing the localisations of tuberculosis.

The same remark applies to the *age distribution* of the disease. The rates differ for each age-group in each sex. In Switzerland (1891-1900), the female rate exceeds the male until the age of 30, then remains lower at the ages above for all but the abdominal form. The meningeal and abdominal tuberculoses show, until age 5, a very high rate, which rapidly declines afterwards. The maximal rate for pulmonary tuberculosis is to be found in the age-group 20-29. The American statistics show a male rate lower than the female until 19, then higher from 20-39 ; then an approximation of both rates thereafter. We give here, as an example, the Swiss death-rates, specific for age, sex and the various localisations of tuberculosis.

TABLE VII.

Tuberculosis Mortality in Switzerland according to Age and Sex and the Localisation of the Disease.

(Distribution by age-groups of 100 deaths from each localisation.)

Tuberculosis	Sex	Under 5 years	5 to 19 years	20 to 29 years	30 to 49 years	50 years and above
Pulmonary . . .	M	0.42	0.43	2.37	2.21	0.79
	F	0.46	0.90	1.18	1.77	0.60
Meningeal. . . .	M	11.96	1.39	0.77	0.45	0.09
	F	13.17	1.58	0.71	0.32	0.08
Acute miliary . .	M	1.99	0.90	2.68	1.85	0.42
	F	2.12	1.66	3.23	1.25	0.24
Abdominal . . .	M	3.47	0.98	1.65	1.35	0.81
	F	2.26	1.01	2.18	1.48	0.74
Vertebral. . . .	M	2.36	1.69	2.00	1.29	0.63
	F	2.87	1.63	1.48	1.20	0.75
Joint.	M	1.95	1.61	1.83	1.17	0.81
	F	2.68	1.75	1.44	1.11	0.77

If we examine the age and sex-distributions of the deaths from each tuberculous form in all countries (United States of America, Switzerland, Japan, Norway, Holland, England and Ireland) at various times, we see that these distributions show a great resemblance between themselves. This indicates that the cause determining the localisation acts in the same way in the various countries. From the statistics we gather that the ages of maximum incidence are not the same for the various forms of tuberculosis and that for each form the age-distribution varies according to sex, but this distribution by age, sex and form of the disease is nearly identical in all countries.

What age-groupings have to be adopted for the tuberculosis mortality statistics ? The tuberculosis mortality being at low ages very high, it is necessary to give a very detailed age-distribution of the deaths of infancy and childhood. Switzerland uses the following age-groups : 0 +, 1, 2-4, 4-14, 15-19, 20-29, 30-39, etc., by ten-year groups.

Bavaria gives annual figures until the age of 15 ; Austria until age 6 ; the latter country subdivides the first year into : 0 +, 1, 2, 3-5, 6-8, 9-11 months. England does the same thing and uses the following groups : 0 +, 1, 2, 3-5, 6-11 months, then annual figures until five years. It is desirable not to give only ten-year age-groups after age 5. Five-year groups should be used until age 40, at least.

The rates of mortality must be as specific as possible. Global rates uniting, for instance, both sexes or different forms of the disease, or the different ages, may give an erroneous idea of the actual state of tuberculosis mortality, because in that way there may be merged arbitrarily rates which may be quite different in both sexes, at each age and in each form of tuberculosis.

We have seen that :

1. Global rates of deaths from tuberculosis vary according to age ;
2. Rates specific for age vary according to the form of tuberculosis considered ;
3. Rates specific for age and form vary according to sex.
4. Lastly, these rates specific for age, sex and form vary from one region to another in the same country.

In order to obtain uniformity of the statistics, it would be desirable to adopt the same nomenclature and the same conceptions of the forms of tuberculosis (for instance, the nomenclature given on page 36), and the same age-grouping — for instance, the following :

0 +	month	4	years	30–34	years
1	,,	5	,, (end of pre-school age)	35–39	,,
2–5	months			40–44	,,
6–11	,,	6–9	,,	45–49	,,
12–17	,,	10–14	,,	50–54	,,
18–23	,,	15–19	,,	55-59	,,
2	years	20–24	,,	60–69	,,
3	,,	25–29	,,	70	,, and above

If it is not possible to make a division as fine as the one given above, the age-grouping must not, however, be given too summarily. This is the case with the groupings adopted in France and Germany, which do not allow a detailed study of tuberculosis at the age of industrial employment. French statistics, which do not make any sex-distinction, are still more deficient from this standpoint.1

The age-grouping proposed above is quite acceptable if one estabishes two distinct kinds of statistics : general and special statistics. The general statistics could give, every year, the total of deaths caused by each disease. Special statistics might be published, for instance, every five years and could give the subdivisions by age-groups, sex and geographical distribution of certain diseases of special interest, such as tuberculosis, cancer, infantile mortality, etc. These special statistics would give enough details to allow medical and statistical researches.

2. Nomenclature of the Forms of Tuberculosis.

35. The following principles might be followed for the methodical distinction of the various forms of tuberculosis and their detailed classification.

A detailed nomenclature ought to indicate separately all the forms. The International Nomenclature, which groups under the same heading several forms, does not do it (German nomenclature is more detailed than the *International List*). Other countries also give in their statistics more details on certain points. Between these and the abridged International Nomenclature all degrees of nicety in the classification may be found.

One may :

1. Group under a single title, but separately according to sex, the exceptional forms ;
2. Not mention the localisations which are certainly secondary (bladder) ;
3. Not group any forms except those having the same origin and presenting the same evolution :

(a) One must distinguish, consequently, the general involvement of the meninges in the course of the tuberculous bacillemia from an isolated tubercle in the meninges. Though the origin and the clinical course of both cases are quite different, they are at present, nevertheless, united under the same title of " meningeal tuberculosis ".

(b) Certain forms are mostly only extensions from other localisations, for instance, pleural tuberculosis from pulmonary tuberculosis, joint from bone tuberculosis, peritoneal from intestinal tuberculosis, etc. In all these cases the physician uses either one of the associated forms for his diagnosis.

(c) The classification must enable one to make the distinction between the various environmental influences at the various ages in each sex.

(d) The classification must distinguish the forms which are more frequent in males (bone, joint, genito-urinary tuberculosis) from those which are more frequent in females (lupus, peritonitis) and from the forms which have the same incidence in both sexes. These various forms must not be mixed under the heading "other forms of tuberculosis".

(e) The various forms of tuberculosis may be divided into three groups according to their age-distribution :

(i) Meningeal and miliary tuberculosis, which are very common in infancy but decline with age.

(ii) Pulmonary tuberculosis, which is most frequent at the adult ages.

(iii) Bone, joint and genito-urinary tuberculosis, the incidents of which show little variation with age.

If we superpose these various divisions, we reach the classification which fits the nomenclature given above (page 36).

3. Presentation of Statistics.

36. The published statistics must give, together with the number of deaths at each age-group, the corresponding population figures. There is very little use for the number of deaths by age-groups or sex without the corresponding population distribution, because it is not possible then to obtain specific rates.

Specific rates are essential for international comparisons. Specificity must be obtained for age, sex and race. American statistics give many proofs of the importance of this latter factor on tuberculosis mortality ; the proportion in which each race is represented must be known, the difference of rates between individuals of each race (white and coloured), of each origin (American-born, immigrants from various countries) being considerable. In the north-east of the United States of America, the immigrants of European origin have higher death rates from pulmonary tuberculosis than the American-born, but lower rates from the other forms. Individuals of Italian stock, for instance, which have the lowest death rate from pulmonary tuberculosis, have an extremely high rate from meningeal and abdominal tuberculosis. These differences of rates can partly be explained by the differences in age distribution of the population. This shows that the rates must be specific for both race and age.

In order to make comparisons easy, in space and time, of tuberculosis death rates, one may use standardised death rates. In order to obtain these rates, one applies to the various groups of the standard population the corresponding specific rates found in the real population and obtains thus a fictitious number of deaths which the standard population would have shown if it had been submitted to the actual mortality conditions. The main advantage of the standardised death rates is that it does away with the differences in age and sex-distributions of the population of the various countries

compared. It is obvious that an international agreement must determine which population shall be used as a standard for the calculation of standardised rates.

CONCLUSIONS.

37. The tuberculosis mortality statistics are still far from being exact; however, they tend to become so and have already made great progress in the past. Their imperfections do not prevent us from following the variations of the tuberculosis mortality if we take the necessary precautions indicated in this report. The tuberculosis statistics, analysed with enlightened criticism, may show the variations of tuberculosis mortality from all forms in the various countries for each age and both sexes. Statistics prepared in this manner may give a solid basis for researches tending to the discovery, not only of the causes of variation of tuberculosis mortality, but of the causes themselves of this mortality.

38. ALPHABETICAL INDEX.

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Health Organisation

MALARIA COMMISSION

Report on the First Results of Laboratory Work on Malaria in England

BY

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Medical Officer and Adviser on Tropical Diseases to the Ministry of Health, London,
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GENEVA 1926

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Laboratory Assistant, Ministry of Health.

The international studies of malaria which are being undertaken by the Malaria Commission of the League of Nations cover a wide field. For many of these questions it is of the greatest importance to take account of additional knowledge which is gained relating to the natural history of the disease, and, as some recent work for which I have been responsible in England in connection with the malarial treatment of general paralysis of the insane has produced interesting results, I communicated them to the Commission at its meeting in Paris on March 3rd last. The Commission having concluded that their submission to the Health Committee and publication was desirable, and the assent of the British Ministry of Health having been obtained, I have now the honour to submit the following report.

In England, the Government Department which administers the Acts relating to the care of mental patients takes the view that, with regard to the malarial treatment of cases of general paralysis of the insane, there are serious objections to the method of inducing the malarial attacks by the direct inoculation of blood from patient to patient. The official arrangement in this country by which general paralysis and other mental diseases can be treated is an arrangement for giving malaria by the bites of infected mosquitoes instead of by direct blood inoculation. It has fallen to me at the Ministry of Health to infect mosquitoes for the purposes of the treatment and to induce malaria by their bites at mental hospitals in different parts of the country. To assist in this work, Colonel J. R. Lord, C.B.E., Medical Superintendent of the Horton Mental Hospital, Epsom, arranged to set apart an isolated block of the hospital for the treatment of patients and to place a laboratory at my disposal in this block. I take this opportunity to thank him for these and other arrangements which greatly facilitated our task and also to thank Drs. Moodie and

S. d. N. 1600 (A.) 1550 (F.). 3/26. — Imp. Atar.

Nicol, Medical Officers of the hospital, for much assistance in every aspect of the worl
Dr. Nicol was in medical charge of the patients who passed through the course o
treatment at Horton during the two years with which this report is concerned and als
collaborated with us in the laboratory and clinical studies. The authorities of th
Horton Mental Hospital arranged for the treatment block and laboratory to b
mosquito-proofed and furnished, but the Ministry of Health met all charges fo
laboratory apparatus, salaries, and travelling and other expenses connected with th
enquiry.

The work provides an opportunity of studying malaria contracted in the natura
way and the conditions and circumstances governing the infection of mosquitoes
Before recording our observations on these subjects I must give the following informa
tion of the material on which the observations are based :

1. The practical object of our work is the continuous provision of a supply o
mosquitoes for inducing a pure infection of benign tertian malaria in patients to b
treated.

2. Our work is concerned only with the benign tertian malaria parasite (*Pla
modium vivax*) and with *Anopheles maculipennis* (Meigen). The strain of *P. viva*
which we used in the earlier months of our work was originally obtained from a patien
who contracted malaria in India. It had been proved to be a pure strain of *P. viva*
by direct blood inoculation through several passages before we commenced to infec
mosquitoes with it. This strain was lost during an unavoidable interruption o
the work. We obtained our present strain of *P. vivax* personally from an otherwis
healthy patient who contracted malaria in Madagascar, and we proved it to b
an unmixed strain by direct blood inoculation into two patients before beginning t
infect mosquitoes with it. The mosquitoes (females of *maculipennis*) which we us
are not bred from larvæ but are collected in the adult stage in a country district wher
malaria does not occur.

3. During the 24 months ending December 31st, 1925, 18 batches of mosquitoe
were fed on benign tertian malarial patients and were incubated at 22° to 24° C. fo
the purpose of obtaining supplies of infected insects. Twelve of the 18 batches wer
successful and six failed.

4. About 2,630 female mosquitoes (*A. maculipennis*) were used in the 1
batches, but only about 530 of them ultimately were available for infecting ne
patients.

5. Of these 530 mosquitoes, nearly all had sporozoites in their salivary gland
when used for infecting patients. During the 24 months, 145 patients were subjecte
to their bites (some on more than one occasion) for the purpose of inducing malari

Of these 145 patients, 109 developed benign tertian malaria within the usual incubation period of the disease and 36 failed to do so.

6. The following statement gives details of the above information:

Serial number of the batch.	Month and year	Number of mosquitoes with which batch was commenced	Number of mosquitoes ultimately available	Percentage infected (sporozoites in gland) when used for infecting patients	Number of patients bitten by mosquitoes of the batch for inducing malaria.	Number of patients who developed malaria.	Number of patients who failed to develop malaria.
1.	Dec. 1923	80	12	25 per cent	3	0	3
2.	Jan.-Feb. 1924	100	40	100 ,, ,,	12	9	3
3.	March 1924	60	2	100 ,, ,,	3	1	2
4.	April 1924	60	6	100 ,, ,,	2	2	0
5.	May 1924	80	2	100 ,, ,,	1	0	1
6. (*a*)	June 1924	200	—	—	—	—	—
7. (*b*)	June 1924	58	—	—	—	—	—
8.	August 1924	400	120	100 per cent	14	14	0
9. (*c*)	Feb.-Mar. 1925	200	—	—	—	—	—
10. (*d*)	April 1925	100	—	—	—	—	—
11. (*e*)	May 1925	80	—	—	—	—	—
12. (*f*)	May 1925	80	—	—	—	—	—
13.	June 1925	80	40	80 per cent	17	17	0
14.	June 1925	60	30	100 ,, ,,			
15.	July 1925	200	40	100 ,, ,,	14	14	0
16.	August 1925	300	150	100 ,, ,,	16	16	0
17.	Sept.-Oct. 1925	200	50	100 ,, ,,	27	26	1
18.	Nov.-Dec. 1925	300	40	20 to 85 p. cent	36	10	26
		2,638	532		145	109	36

(*a*) Full-grown zygotes present on 17th day, but no individuals lived long enough for sporozoites to appear in the glands.

(*b*) This batch was kept at room temperature 18° to 21° C. Full-grown zygotes were present on the 23rd day, but on the 30th day all the remaining specimens were negative.

(*c*) Forty alive after 12 days but none infected.

(*d*) Thirty alive on 8th day. 50 per cent were infected, but the number of zygotes was so small that the batch was not continued.

(*e*) Fourteen alive on 10th day but none infected.

(*f*) None infected.

7. Temperature charts and other particulars of about 100 of the successful cases are available. Clinical particulars of some of the cases which failed to develop malaria have also been obtained.

In recording the observations which are at present available, I shall endeavo when possible to correlate them with epidemiological and clinical observations.

Length of Life of the Mosquitoes used.

The length of life of mosquitoes is one of the most important factors in relati to their infection. A glance at the tabular statement given above will show that large supply of suitable mosquitoes was the first condition necessary for obtaini mosquitoes with infection of the salivary glands ("infective mosquitoes"). It w be seen that batches of 80 or 100 mosquitoes sometimes became batches of only 2 12 by the time that the batch could be classed as "infective" and, on the totals of t successful batches, about 1,900 mosquitoes yielded infective batches comprising on 532 mosquitoes in all. The chief cause was the high mortality of mosquitoes in t conditions necessary for infection. According to our results the mortality of *macu pennis* in the somewhat "tropical" conditions of temperature and humidity in whi batches are kept in order that they may become infected is usually at the rate of abo 50 per cent of the available insects during each week or ten days of life under tho conditions. We find that even a small reduction of the temperature of the incubat lessens considerably the rate of mortality of the mosquitoes. For this reason, wh our initial supply of insects is small, we make a rule to incubate the batch at 22º instead of at 24º C. The batch takes longer to become infective but the final resu is that we have a larger supply of infective individuals than we should have if t batch were incubated at the higher temperature. On the same lines we find th when we endeavour to incubate a batch at 26º C. (in order to get some individua quickly infective) it is almost impossible to prevent all of them dying before the end the period necessary for infection of the salivary glands. At that temperature hard an individual mosquito which does not take a meal of fresh blood daily lives t necessary time. Failure to feed every day, or at least every other day, during t period of life in the incubator, always results in high mortality, and we have lo several batches completely when for some unavoidable reason they have been le unfed from Saturday until Tuesday.[1] When possible we overcome the difficul by the plan indicated in the following extract from our diary:

> "*Fourth day of incubation.* — Of 120 mosquitoes, 28 did not feed. Th were separated from the batch and kept at room temperature — 12.2º C. — f

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[1] Life in the incubator can be prolonged if the mosquitoes are allowed to feed on gluco raisins, dates, bananas, etc. But mosquitoes so fed are often reluctant thereafter to suck blo and they quickly become infected with bacteria and moulds which interfere with the develo ment of the malaria parasite and sometimes cause the death of the mosquitoes. After ma trials we have decided that for the purpose of our work the only suitable food is fresh bloo Rabbits and guinea pigs can be used when a human source fails, but mosquitoes are sometim reluctant to bite these animals.

48 hours and then put in the incubator at 24° C. for an hour. They were then given an opportunity to feed. Eight fed and were transferred to the original batch in the incubator. Three of the remaining 20 died and were dissected (all carried zygotes), the rest were again kept at room temperature till next day, when four fed and were transferred to the original batch in the incubator. The same procedure was continued. The next day 8 fed and were added to the original batch, the rest died and were dissected. All carried zygotes, one Ross's black spores."

At low temperatures *maculipennis* lives much longer. Therefore it is our practice hen a batch has become "infective" to transfer it to an ice-chest at temperatures f from 4° to 6° C. The batch is then used for infecting patients. The mosquitoes hich feed upon those patients are replaced for a few hours in the warm incubator 24° C. to hasten the digestion of blood and are then put back in the ice-chest, where ey remain until another patient is to be infected. Under these conditions batches f infective insects have lived from a month to about 2 $^1/_2$ months after sporozoites ave reached the salivary glands, and certain individual mosquitoes have lived much nger.

Comment. — It is probable that mosquitoes in a laboratory where all their needs re immediately available without effort or risk to life, live at least as long as they ould live in nature. Therefore observations on the rate of mortality of mosquitoes ept at different temperatures under favourable conditions in the laboratory can be pplied to problems of malarial epidemiology. For example, if our rate of mortality f *maculipennis* at 24° C. is approximately correct, we must conclude that, when that emperature is continuous for ten days or more in nature, only one of every five ndividual mosquitoes which suck blood from suitable cases of malaria will survive ntil it can infect another person. In other words, unless at least five mosquitoes ite a malaria carrier, the disease will not be carried from him to another person. Again, the observations relative to the high rate of mortality of mosquitoes at 26° C. and higher temperatures indicate the possibility that the rarity or absence of new cases of malaria during very hot seasons (and perhaps the absence of *P. falciparum* infections from some countries) may be due chiefly to the short life of mosquitoes during such periods. Of course, in drawing conclusions on this subject it must be remembered that when the period of high temperature is intermittent instead of being continuous, the mosquito mortality is much less. Our laboratory observations on the long life of *maculipennis* at low temperatures are in accordance with their known long life in nature at the same temperatures and are important in relation to the persistence of malarial infection and the manner in which, in cold climates, the malaria parasite may be carried over the winter. I shall now record our observations in relation to that subject.

Resistance of Zygotes and Sporozoites to Cold. Persistence of Infect Power of Sporozoites.

The plan of keeping the infected batch of mosquitoes in an ice-chest reprodu artificially what happens to *maculipennis* in nature during winter in northern clima It has enabled us to add something to the literature on the resistance of zygotes sporozoites to cold and on the duration of infecting power of mosquitoes. To ex plify the observations I propose to record particulars of one of our successful batc

Batch N° 16, consisting of 300 female maculipennis. — Collected on August 1925. Fed six times from August 7th on one benign tertian case and four times another case. Incubated at 24° C. Became infective (sporozoites in glands) Au 17th (ten days from first infective feed).

August 22nd. Batch (150 mosquitoes) placed in ice-chest at 5.5° C. Remo a few hours later and used for infecting a patient at the hospital to which laboratory is attached; 120 bit. Replaced in ice-chest.

August 23rd. Batch removed from ice-chest and taken by train and to a London hospital to infect a patient; 40 bit. Replaced in ice-chest return to the laboratory.

August 24th. Removed from ice-chest and taken a similar journey to anot London hospital where four cases were infected. Numbers of bites 3 to Replaced in ice-chest on return to laboratory. Ice-chest temperature to- is only 4° C.

August 24th to 27th. In ice-chest.

August 27th. Used for infecting a patient at the hospital to which laboratory is attached; 60 bit. Replaced in ice-chest.

August 28th to September 1st. In ice-chest at 5.5° C.

September 1st. — Batch taken by train and cab 14 miles. Two cases fected. On return to laboratory, placed in warm incubator at 23° C. for 24 hou

September 2nd. Replaced in ice-chest. Two specimens were dissect to-day. The glands of both were heavily infected. One stomach was negative, t other carried about 30 ripe zygote .

September 2nd to 10th. In ice-chest at 5.5° C. The results of dissections between these dates were as follows:

Number dissected	Stomach positive (zygotes)	Stomach negative	Glands positive (sporozoites)	Glands negative	Ross's black spores
18	8	9	18	—	1 in glands and stomach.

September 10th. Removed from ice-chest and placed in incubator at 23° C. for 12 hours. Then taken to London and Bath (110 miles by train), where one case was infected; 20 bit.

September 11th. En route from Bath.

September 12th to 18th. In ice-chest at temperatures varying between 4° and 5.5° C. The results of dissections between these dates were:

Number dissected	Stomach positive (zygotes)	Stomach negative	Glands positive (sporozoites)	Glands negative	Ross's black spores
19	2	17	19	—	1 in glands.

September 18th. Transferred to incubator at 23° C. for 1 hour and then fed on patient. Replaced in ice-chest at 4° C.

September 18th to 22nd. In ice-chest and on 21st in room.

September 22nd. Used to infect two patients at hospital 20 miles away. On return kept at room temperature.

September 23rd to 26th. At room temperature and on journeys for infecting patients in hospitals in London. Two patients infected.

September 26th. Replaced in ice-chest at 5.5° C.

September 27th. Used for infecting patient at the hospital to which the laboratory is attached; 7 bit. Replaced in ice-chest.

September 27th to October 14th. In ice-chest continuously. The minimum temperature registered is 4° C., the maximum 5.5° C.

October 14*th*. Six mosquitoes remain. They were fed on a patient to-d Temperature in ice-chest is only 3.5° C.

October 14*th to November* 4*th*. In ice-chest.

November 4*th*. Two mosquitoes remain. They were used to infect patient, but only one bit. Replaced in ice-chest at 4.5° C.

November 4*th to* 9*th*. In ice-chest.

November 9*th*. One of the two mosquitoes was dissected to-day. stomach contains 16 zygotes which appear in all respects normal. Its saliv glands contain large numbers of sporozoites. The other mosquito fed again the patient who was bitten by it on the 4th.

November 9*th to* 16*th*. In ice-chest.

November 16*th*. The remaining mosquito is still strong and active bu was decided to sacrifice it for demonstration purposes. Its salivary gla contained numerous sporozoites which were actively motile and showed no s of abnormality. Its stomach was full of uncoagulated red blood but the prese of zygotes was determined.

November 20*th*. The patient who was bitten on November 4th and 9th the single mosquito just mentioned began a typical attack of benign tert malaria to-day.

Summary. — The total length of life of the mosquito which was killed on Nov ber 16th cannot be stated, because it was collected with the rest of the batch as adult on August 5th. Between that date and the date of its death (three and a- months) it spent about three weeks in an incubator at 23° - 24° C. and about two a-half months in an ice-chest at 4° - 6° C. The rest of its days were passed in roo hospitals, railway trains, cabs, etc. at the ordinary air temperature of the time of y It was continuously infective from August 17th to the date of its death (92 da During that period it had opportunities of feeding upon patients and therefore injecting sporozoites into them on at least 40 occasions. It successfully infecte patient by a single bite more than two and a-half months after it first beca infective. [1]

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[1] We reckon duration of infectivity from the date on which sporozoites are known t present in the salivary glands. Some workers reckon from the date on which the mosq first sucked blood from the infecting malaria case (*e.g.*, Bruce Mayne in *United States Pu Health Reports*, Vol. 37, May 5th, 1922, No. 18, page 1061).

Before commenting on these observations the following records may be added:

Batch No. 17. — After this batch became infective (sporozoites in glands) it was kept in the ice-chest, except when required for infecting purposes. The periods and temperatures were: 17 days at 3° to 5.5° C.; 8 days at 4° C.; 6 days at 3° C.; 21 days at 4° to 5.5° C. The last period ended on November 20th. The next day the mosquitoes were taken to Warwick (90 miles), where three patients were successfully inoculated by their bites.

Batch No. 18. — Sporozoites were present in the glands on November 17th. Between that date and December 23rd the batch was in the ice-chest four days at 3° C.; six days at 0.5° to 1° C.; six days at —1° to 0° C.; ten days at 1° to 3° C. A patient in Devonshire (180 miles) was successfully inoculated by bites on December 26th.

Batch No. 19.[1]— This batch was fed six times on a suitable case from December 15th and then transferred to the ice-chest in order to tide over the Christmas holidays. It was in the ice-chest 14 days at temperatures varying between 1° and 4° C. On January 6th feeding and incubation were again commenced and the zygotes completed their development normally.

Comment. — The observations show that as regards *P. vivax* the oocysts in the stomach and the sporozoites in the glands are not killed when a mosquito lives continuously for three weeks at the low temperature of 4° to 5.5° C., nor even when the temperature during six days is below freezing point. Nor are they killed when a mosquito lives intermittently at a low and at a high temperature for a long period. Growth and development of oocysts are arrested at the low temperatures but begin again when the temperature becomes sufficiently high. In the experiments recorded, the mosquitoes, when removed from the ice-chest between the periods stated, were subjected from time to time to temperatures of 22° C. to hasten the digestion of blood, and they were greatly shaken during the long journeys on which they were taken for the purpose of infecting patients. Under these conditions the mosquitoes in the batches referred to lived and continued to be infective for periods ranging between 29 days and 92 days after the first date on which sporozoites were present in their salivary glands. These observations seem to be of considerable interest as supporting and supplementing the findings recorded as a result of dissecting mosquitoes caught in nature during the winter, particularly those recorded for Holland by Swellengrebel[2], for Macedonia by Wenyon[3] and for Fiumicino (Rome) by Sella[4]. Considering the findings of these observers in conjunction with our laboratory results we do not doubt that benign tertian malaria (*P. vivax*) can be carried through even a severe winter in hibernating mosquitoes. It seems clear also that the carriage of

[1] The records of this and of subsequent batches are not included in the present report.
[2] Swellengrebel, in *Neder. Tijds. V. Geneeskunde*, August 9th, 1924, Vol. 68, No. 6, p. 750.
[3] Wenyon, in *Journal of the Royal Army Medical Corps*, Vol. 37, 1921, p. 187.
[4] Sella, in *The International Journal of Public Health*, Vol. 1, No. 3, Nov. 1920, p. 341.

the parasite in the mosquito through the winter can be in either the oöcyst stage the sporozoite stage or both.

An important detail in connection with duration or persistence of infectivi through the winter must be mentioned. It is considered by some observers that mosquito cannot be a carrier of the *sporozoite stage* of the malaria parasite througho the winter, for the following reasons: (1) it would evacuate all the sporozoites by biti animals or human beings on the days when (as occasionally happens even duri severe winters) the weather is warm enough to rouse mosquitoes from their wint inactivity; (2) sporozoites which remain a long time in the salivary glands degenera and lose their infecting power (ROUBAUD, in C. R. Acad. Sc., February 11th, 191 p. 264). As regards the first reason I agree that, when a mosquito has no reserve sto of ripe oöcysts in its stomach from which the stock of sporozoites in the glan becomes replenished, the mosquito loses its infectivity after it has bitten a considerab number of persons or animals. I shall give below some indication of the number times it must bite in order to get rid of all the sporozoites. But in this connection must be remembered that an infected mosquito often carries oocysts at sever different stages of development. They ripen and rupture at different times and consequence the salivary glands are continually being replenished with sporozoit during a considerable period. The following results of dissections exemplify the tw classes of infected mosquitoes referred to:

	Batch 16, in which the salivary glands were continually being replenished with sporozoites			Batch 18, in which the salivary glan were not being replenished		
	Mosquitoes found infected during each ten-day period following the first infective feed					
	With oöcysts (stomach)	With sporozoites (salivary glands)	Number of opportunities of biting given during the period	With oöcysts (stomach)	With sporozoites (salivary glands)	Number o opportuni ties of bitin given dur ing the period
	%	%		%	%	
1st ten days	92	0	—	48	0	—
2nd „ „	86	20	15	70	5	—
3rd „ „	45	100		6	75	19
4th „ „	27	100	2	0	85	6
5th „ „	57	100	10	0	85	4
6th „ „	60	100	8	0	66	8
7th „ „	100	100	2	0	20**	4
8th „ „	—	—	0	—	—	—
9th „ „	—	—	0	—	—	—
10th „ „	100	100*	1	—	—	—

* Salivary glands still crowded with numerous sporozoites.
** Two infected out of ten examined but the sporozoites in both cases were very few.

It will be clear that the mosquitoes of Batch 18 were gradually getting rid of heir sporozoites after the fourth ten-day period but that the process evidently equires that the mosquito should bite a considerable number of times. The mosqui-oes in Batch 16 remained heavily infective during the whole period of their life. On he question whether sporozoites degenerate when they remain a long time in the alivary glands we have no evidence to offer except to say that we have not as yet ound any inactive sporozoites in our mosquitoes.

Factors relating to the Infection of Anopheles.

For the practical purposes of our work it is necessary that the sporozoite rate f our infective batches should be, as nearly as possible, 100 per cent. The tabular tatement already given on page 5 shows that we succeeded in bringing nine of the welve successful batches to that degree of infection, but I may say at once that it is ot easy to do so, and that I am not at all surprised that a low sporozoite rate is usually found in nature. A few remarks concerning each of the factors known to be f importance for infection will not be out of place. The important factor of the *ength of life of the mosquitoes* concerned has already been dealt with on page 6.

The Source of Infection.

It is surprising what a small proportion of persons who suffer from malaria are nfective to anopheles. Unfortunately I have not found any definite figures on the subject in available malaria literature, and I am not able at present to give adequate figures from our own experience. But no one who studies the literature of experiments relating to the infection of anopheles can fail to note the lack of success which in general attended those experiments. I am impressed, also, by our frequent failures to infect anopheles from seamen and others who (having contracted malaria abroad) suffer from relapses in England, as well as by some failures and some unexpectedly small infections during our work at mental hospitals. During this work it has been our experience that some patients with induced malaria are not at all infective to anopheles at any period of their malarial course, that others are only moderately so, and that rarely one comes across a patient who is quite strikingly infective. Mos-quitoes which have only one opportunity of sucking blood from a patient in the third category become more heavily and more quickly infected than mosquitoes which feed several times on patients in the second category. We find, also, that patients in the third category retain the quality of being very infective to anopheles in second

attacks and that patients who are only moderately infective in a first attack are al only moderately infective in a second attack. Therefore we are accustomed to spea of certain patients as being "good infectors" and of others as being "poor infectors" The character persists throughout the period of the patient's malarial course. Some times an individual in each category may be found among a group of patients wh have all been infected from the same batch of mosquitoes. On blood examination th difference between the two classes of patients is usually indicated by finding that th patient who is a "good infector" carries a large number of gametocytes, while th patient who is a "poor infector" carries only a few, but my impression is that th quality of the gametocytes (perhaps in the character of "ripeness") is also differen One reason why we do not attach so much importance to the number of gametocyt as we do to their quality is that we have had many failures to infect batches of mo quitoes when the number of gametocytes present in the patient's blood was conside ably in excess of the often-quoted figure of 1 per 500 leucocytes (12 per c.mm. of blood

Day on which Gametocytes appear in the Peripheral Blood.

In first attacks of benign tertian malaria contracted by the bites of mosquito we have never found gametocytes in thin films of blood taken before the seventh da after the first rise of temperature; and early dissections show that the gametocyt are not infective to anopheles until about three days later. In relapses, howeve gametocytes can be found much earlier — usually, indeed, on the first day on whic the occurrence of the relapse is reported. Also they can be found earlier in firs attacks of malaria induced by direct blood inoculation than in first attacks induce in the natural way.

The Number of Gametocytes and their Sex.

There are great differences in the numbers of gametocytes found in the per pheral blood of different cases and considerable differences in the number presen in the blood of the same patient from day to day. The numbers in the blood of thre patients on whom we fed successful batches of mosquitoes rose from a minimum o 10 to a maximum of 70 per 500 leucocytes in the first patient, from 7 to 700 in th second and from 10 to 120 in the third. The number rises rapidly at the beginnin of the second week of the malarial attack and sometimes falls during the third wee There are usually fewer male than female gametocytes in the peripheral blood; a regards the three instances referred to above, the first patient had, on an averag among each 100 gametocytes, 35 males and 65 females; the second 23 males an 77 females; the third 43 males and 57 females.

Importance of the Number of Feeds on Infective Blood.

The number of times that a mosquito feeds upon the malaria case is one of the
nost important factors in its infection. This was demonstrated as long ago as 1901
y Daniels. We find that, unless an "exceptionally good infector of anopheles" is
vailable, it is quite necessary that our batches should be fed several times upon the
nalaria case in order that a sufficient proportion may ultimately become "infective"
sporozoites in glands). We give each batch of mosquitoes an opportunity to feed
n the infective patient or patients every day for seven days, and we continue longer
vhen the results of dissection show that the oöcysts are not approaching maturity.
Batch No. 18, which we did not succeed in bringing to the degree of 100 per cent
nfection, was fed only five times on one infective patient. The number of gameto-
ytes per 500 leucocytes in the patient's blood on each of these days was respectively
7; 25; 710; 200; 259. As a result of the first two feeds, only 40 per cent of the mos-
quitoes which had fed became infected with oöcysts, and three was the highest
number of oöcysts found in any mosquito dissected. Following the further feeds
n the third to the fifth day, the percentage infected rose to 70 and the numbers
of oöcysts found varied between 8, 20, 40 and "numerous". Ultimately the salivary
glands of 85 per cent of the available mosquitoes in the batch became infected.

The Insect-Carrier.

I do not think that the English *maculipennis* becomes infected as readily as
some tropical species of anopheles such as *culicifacies*, *ludlowi*, etc. might do if they
were placed in the same favourable conditions as those in which our batches are kept.
Infection of *maculipennis* after one feed upon a moderately infective case is quite
uncertain, and we are tolerably sure that in some individuals of different batches,
young zygotes which seem to have begun to grow well sometimes cease to develop
and gradually become absorbed without coming to maturity. We have had to dis-
continue more than one batch which, on the third day, showed quite a high percen-
tage of infection because by the eighth or ninth day all dissected individuals were
negative. We cannot offer any other explanation than that the zygotes failed to
continue their development and disappeared [1]. As a result of many trials we have
come to believe that mosquitoes which at first seem refractory to infection can be

[1] In this connection it is surprising how few observers, when comparing the relative carrying-power of different species, have continued the experiments until sporozoites were present in the salivary glands. If it is true that some mosquitoes may be carriers of the parasite as far as the stage of young oöcysts, but not further, it would be necessary to base tests of carrying-power on the salivary gland findings only.

forced, so to speak, to become infected by repeated feeding on a suitable case. ' think that this plan of repeated feeding added to the selection of suitable cases which to feed have been the chief factors in our successful results.

Time taken for Development of the Parasite in the Mosquito.

The earliest day on which we have found sporozoites in the salivary glands some individual mosquitoes in a batch has been the tenth day after the first fe on the infective patient. This refers to batches incubated at 24° C. in a saturat atmosphere. After sporozoites are found in the glands we usually wait a furth day or two days before beginning to use the batch for infecting patients.

Influence of Temperature, Humidity and Season.

In our experience the best results in infecting *A. maculipennis* with *P. vivax* a obtained at temperatures between 22° and 24° C. and in a saturated atmosphe It is a mistake to try to hasten development of the oöcysts by incubating the mo quitoes at temperatures above 23° or 24° C., as by so doing the life of the mosqu toes is endangered. Changes to different temperatures should also be gradual, n sudden. A batch which has been at a very low temperature in the ice-chest for son days may easily be killed if it is not given time to get accustomed to gradually i creasing temperatures before being subjected to the high temperature of the inc bator. It has been reported that in nature the infection of malaria-carrying anophel in some localities appears to be subject to seasonal variation which cannot be explain on the ground of temperature, humidity, or other known influence. We have n found any marked difference between the infectibility or carrying-power of *macu pennis* at different seasons, but, particularly in relation to degree of infection, v attach some importance to the observations on the influence of egg developmen which we shall report in the next paragraph. We have infected batches in ever month of the year and batches which have newly emerged from the larval stag as well as batches which have been "hibernating" in winter quarters for sever weeks.

Influence of Growth of Eggs and of Oviposition.

In May and June, when the eggs of *maculipennis* are coming to maturity, w have observed an interesting condition which cannot fail to have some influenc on the infection of the individual mosquitoes to which it applies. At this perio

e swollen ovaries fill the abdomen and press against the midgut of the mosquito such a degree that its cavity is almost obliterated. Females in this condition not refuse to suck blood, but the blood, instead of passing into the midgut, fills d distends the œsophageal diverticula. Examining such a female after it has fed, e sees that there is red blood in the abdomen and one concludes that the insect, ving fed on the infective patient, will itself become infected. On dissection, how-er, one finds the midgut quite empty of blood and the œsophageal diverticula stended like small red bladders. From time to time a little of the blood oozes from e diverticula into the midgut, but not in sufficient quantity to ensure the infection the insect. In the same connection another point of importance is that mosquitoes rrying nearly ripe eggs do not suck nearly so much blood as do mosquitoes with developed ovaries. This is doubtless due to the pressure of the swollen ovaries the midgut just mentioned. In contrast to this habit (and in consequence of it) osquitoes which have just laid their eggs (and have survived the egg-laying process) ways feed at once and greedily until the midgut becomes distended with blood. deed, these individuals are so hungry that they will usually bite in the open air they happen to find a person on the bank of the pond on which they have just id their eggs. It has occurred to us that this observation (which we have made on ore than one occasion) affords a reasonable explanation of the rare occurrences which persons become infected with malaria while resting or sleeping in the open r near anopheles pools or marshes. An "infective" mosquito (*maculipennis*) which s not ventured beyond a house or stable up to the time when its eggs become e must make a flight for egg-laying at this time. We conclude from our observa-ons that, if it reaches a breeding-place and survives the egg-laying process, its xt act will be to bite and suck blood from anyone who happens to be near it. In ing so it injects into him the sporozoites which its salivary glands contained before left the house in which it became infective.

Other Influences on Infection.

Reference has already been made to the unfavourable effect of permitting mos-itoes which are being infected to have any other kind of food than fresh blood. is possible that when a mosquito feeds on certain fruits the chemical reaction of e stomach is not entirely favourable to oöcyst development. After several feeds on man blood and omission of other kinds of food, the stomach becomes a more favour-le medium. The only remaining factor to which we propose to refer is that of ance. Undoubtedly this factor enters largely into the problem of how many oöcysts ill result from one or more feeds. Among every batch of mosquitoes, some feed eedily, some lightly and some not at all. Some of them also evacuate a considerable oportion of the sucked blood while they are in the act of feeding. The fertilised metes (travelling vermicules or oökinetes) which are in the middle of the mass

of blood in the mosquito's stomach have less chance of reaching the internal c
of the stomach than those which are in the layer of blood that bathes the wall. Ind
it has sometimes seemed to us that the only oökinetes which succeed in penetrat
the endothelial layer of the stomach lining and which therefore succeed in becom
encysted are those which happen to be actually in contact with that layer at the t
when they were fertilised.

Factors relating to the Recipient of Infection

(Susceptibility, Immunity, etc.)

In our practical work the recipients of infection are the patients who are to
treated with induced malaria. As everyone knows, they are a particular class
patients. Therefore I do not suppose that observations made with regard to
induction of malaria among them are in all respects applicable to the occurrence of
disease among healthier members of the general population. Perhaps this is pa
cularly important in connection with the failure of certain of these patients to deve
malaria after receiving a dose of sporozoites or of malarial blood which would ca
an attack of malaria in a healthy person.

"Susceptibility", "immunity", "tolerance to the effects of the parasite invasio
"individual resistance", etc. are debatable subjects on which as yet our observati
do not throw as much light as I hoped they might do. One reason is that up to
present we have been occupied chiefly in overcoming various technical difficul
which arose during the endeavour to carry out a considerable series of infections
the natural method at all seasons of the year. During this work we have learned t
when an inoculated patient fails to develop malaria, the cause must be sought f
on technical rather than on biological grounds. I think it is justifiable to say t
technical reasons for failure of inoculations or reinoculations have not been sufficie
examined by the many writers who, after a short or a long experience of the dir
blood method of inducing malaria, have added something to the literature of mala
"immunity". What is happening to-day in connection with this subject is remi
cent of what happened fifteen or more years ago when many workers were enga
in experiments on the relative "infectibility" of different species of anopheles m
quitoes. At that time it was often found that, even under what seemed to be the m
favourable conditions, certain individual mosquitoes in a successful batch failed
become infected; and the cause was at once stated to be that "these individuals
doubt possess an active immunity to the malarial parasite". At present, beca
we know more about the technical circumstances relating to the infection of individ
mosquitoes, we are more cautious in attributing failure to biological conditions.
same caution must be exercised in explaining apparent failures to infect or to re-in
human beings.

The account which I gave on page 5 of the material on which our observations are sed contains the statement that 36 patients among the 145 who were bitten by the squitoes of our infective batches failed to develop malaria within the usual incuba- n period of the disease. The tabular statement which is part of that account shows at 34 of those 36 failures occurred during the winter months between November d March and that 26 of them were with the batch of mosquitoes (No. 18) which we l not succeed in bringing to the 100-per-cent degree of infection. The latter fact roduces a great difficulty into the explanation of these failures. The earliest cessful infection with this batch was by bites on November 21st and the latest s by bites on December 26th. Sporozoites were still present (though few in mber) in two of ten individuals of the batch dissected on January 8th. There- e we know that some of the individual mosquitoes were infective throughout the riod during which the batch was being used. But undoubtedly, by about the ddle of the period, the infective individuals had evacuated a large proportion of eir sporozoites into the early patients bitten. Therefore some of the patients bitten ring the second half of the period (during which most of the failures occurred) may ve received only a small dose of sporozoites and others none. For these reasons I am t disposed to discuss in the present report the possible influence of the winter on e failure of malaria to develop within the usual incubation period. Perhaps one two of the patients who were bitten will develop an attack in the spring. If so will prove that they were infected but that the infection remained latent through e winter. On the whole, it seems preferable to defer consideration of that subject til we have worked with a batch of mosquitoes whose infective rate as regards both mber of individual mosquitoes infected and intensity of infection of each insect has en 100 per cent during the whole period of their use.

Next I shall mention the following rather striking results of the infection of tients who were reported as being "immune" after one or more successful inocula- ons, usually by the direct-blood method:

(1) In October 1925, Drs. Nicole and Steel, of the Lancashire Mental Hos- tal, kindly informed me that they had 15 patients who had been inoculated and -inoculated several times, with the result that they had become definitely "immune" further inoculations[1]. I visited the hospital on November 21st, 1925, taking with e some infective mosquitoes of batches 17 and 18. I selected three of the patients d caused them to be bitten respectively by 18, 4 and 7 mosquitoes. All three atients developed malaria between 18 and 23 days after they were bitten. The revious inoculation history of these cases was as follows:

[1] Details of the method of inoculation (which seemed to leave nothing to be desired) will e found in a paper "Acquired Immunity to Malarial Inoculation", by J. E. Nicole and John . Steel, published in the *Journal of Tropical Medicine*, December 1st, 1925.
See also a further report by the same writers in the *Journal of Tropical Medicine*, February t, 1926.

First case. — Successfully inoculated with blood intravenously (direct f
a patient in the same ward) on July 27th, 1924. His attack was typical and
terminated by quinine after the ninth rigor. Subsequently he had relap
Thereafter he was re-inoculated unsuccessfully on the following occasi
February 11th, 1925 (intramuscularly); May 30th, 1925 (intravenously); .
27th, 1925 (intravenously); August 5th, 1925 (intramuscularly).

Second case. — Successfully inoculated with blood intravenously on A
29th, 1924. His attack was typical and was terminated by quinine after
tenth rigor. No relapse. Unsuccessfully re-inoculated on the following o
sions: August 5th, 1925 (intramuscularly); August 31st, 1925 (intramusculai

Third case. — Successfully infected by the bites of mosquitoes in 1923 p
to admission to this hospital. He had a typical attack and acted as dono
malarial blood to several patients. It is not known whether he ha relap
After admission to this hospital he was unsuccessfully re-inoculated on
following occasions: January 7th, 1924 (mosquito bites); April 30th, 1925 (in
muscularly); July 17th, 1925 (intravenously).

Dr. Steel has kindly informed me that, by using the blood of one of these pati
during the attack resulting from the mosquito bites, he has successfully re-inocula
three other of the fifteen patients who previously seemed to be "immune".

(2) At the Claybury Mental Hospital, Essex, several patients in the care
Dr. Rudolf have been given a second and occasionally a third attack of malaria indu
by direct-blood inoculation. In June 1925, Dr. Rudolf informed me that on
these patients, who had reacted to three inoculations, was "quite immune" to furt
inoculations, and that another patient, who had reacted to two inoculations,
"partially immune". On June 24th I visited the hospital and caused each of th
patients, as well as two patients who had not been inoculated previously, to be bit
by mosquitoes of batch 14. All four patients developed malaria between twelve
eighteen days after they were bitten.

It is necessary to add, with regard to the observations at both these hospit
that the strain of benign tertian malaria which resulted in successful infection
mosquito-bites was a different strain from that with which the patients had previou
been inoculated and re-inoculated.

The conclusion which we draw from these observations is that several fr
infections, at intervals, by the direct-blood method with one strain of *P. vivax* do
confer an immunity against mosquito infection with another *vivax* strain.

Lastly, I shall state a few observations at the Horton Mental Hospital, to wh
our laboratory is attached. At this hospital four patients in the care of Dr. W.
Nicol (who, I take this opportunity to say, has assisted us greatly in all our wo

re given a second course of malaria up to the end of 1925. The following statement
ows some particulars:

o. f se	*Dates* 1. First infection. 2. Second infection.	*Methods* 1. First infection. 2. Second infection.	*Incubation periods* 1. First attack. 2. Second attack.	*Number of rigors and type of fever* 1. First attack. 2. Second attack.	Interval between the two infections.
.	1. May 18th, '25	1. Blood inoculation	1. 13 days	1. 15 (quotidian)	$5\frac{1}{2}$ months
	2. Nov. 4th, '25	2. 1 mosquito bite	2. 16 ,,	2. 14 (tertian)	
.	1. June 16th, '25	1. 10 mosquito bites	1. 10 ,,	1. 11 (quotidian)	3 months
	2. Sept. 18th, '25	2. 14 mosquito bites	2. 10 ,,	2. 11 (tertian)	
.	1. July 20th, '25	1. 35 mosquito bites	1. 10 ,,	1. 15 (quotidian)	1 month
	2. Aug. 22nd, '25	2. 120 mosquito bites	2. 15 ,,	2. 12 (tertian)	
.	1. Sept. 27th, '25	1. 7 mosquito bites	1. 14 ,,	1. 9 (quotidian)	1 month
	2. Oct. 30th, '25	2. 8 mosquito bites	2. 14 ,,	2. 4 (tertian)	

We conclude from these observations that one attack of malaria (induced either blood inoculation or by mosquito bites) due to a strain of *P. vivax* does not confer immunity against a second infection with the same strain.

It will doubtless be noted that in this section I have refrained from recording servations on the clinical character of a second as contrasted with a primary ack. Probably some valuable conclusions on "tolerance to the effects of the rasite invasion" might be drawn from such a study. But having regard to fact that, in the particular class of patients treated, the clinical reaction to even primary attack of malaria varies considerably, I think it preferable to postpone comparison of the kind indicated. Nevertheless, one cannot entirely neglect the servation that the clinical character of a second infection is quite different from that a primary infection [1]. It is clear that the difference between the temperature charts the two classes of case indicates that a striking change in the patients' reaction to larial infection has occurred; his blood or tissues have acquired some quality which viously they did not possess. But we are not justified in assuming that the new ality indicates the presence of "immune bodies". Nor can we assume that the few tients who react to a primary infection in the manner in which the great majority patients react to a second infection are naturally possessed of these "immune bodies". may be that a simpler process is at work. We know that the malaria parasite ives and multiplies better in the blood of some individuals than in that of others.

[1] See the following section: "Clinical observations".

I have already mentioned the observation that some individuals with malaria "good infectors of anopheles", others "poor infectors". Also, there is no doubt some individuals are very "susceptible" to malarial infection. In these patient parasites multiply very rapidly until a surprisingly large proportion of blood corpu become infected. They are the patients whose attack of malaria must be stoppe giving them quinine as soon as possible. On the other hand, there are individ whose blood seems to be not at all hospitable to the parasites. It is curious that individuals are found most often among persons whose state of general health is poor. They are patients for whom a malarial course of treatment of their m disease is quite unsuitable, because it can be predicted with some assurance tha malarial infection in them will be manifested by only a few inconspicuous ris temperature and a scanty parasite invasion of the blood. In my opinion it is q incorrect to consider that these patients possess a relative "immunity" if we mea that term to imply that their blood contains "immune bodies". I am incline suggest that it would be worth ascertaining whether some of the differences of "sus ibility" and of "resistance" to malarial infection among different individuals be due to a relatively simple cause, such as a slight modification of the normal alk ity of the blood, or a change in its content of lecithin and other proteins, or perha phosphorus, rather than that it may be due to the presence or absence of "imm bodies". I suppose that if the problem is of that nature a biochemist might sol if he had the opportunity of examining the blood of patients who are very "sus tible" to infection and of comparing it with the blood of patients who are relati "resistant" or "refractory" to infection.

CLINICAL OBSERVATIONS.

The discovery that in some respects the classical description of benign te malaria cannot stand is one of the most striking results of a study of the ind disease. Our observations suggest that the following are among the chief p which merit consideration in framing a new description of the disease:

1. In a primary attack of untreated benign tertian malaria three stages ca recognised; they may be termed, respectively, the initial stage, the developed st and the terminal stage.

2. The initial stage ordinarily lasts from two to five days. It begins as a dually increasing irregular fever. At first the fever is subcontinuous or irregu

mittent, but towards the end of the stage it is always intermittent. There are no rigors" during this stage. Its termination is sometimes shown by an intermission sting 24 or 48 hours.[1]

3. In the developed stage a primary benign tertian malaria in 80 per cent of ses is not a tertian fever but is a quotidian fever. There is a "rigor" every day. his is true whether the patient has been infected by only one bite of one mosquito a single occasion or whether he has been infected by the bites of many mosquitoes several different dates during the incubation period of the disease. The stage of otidian fever often lasts more than ten days.

4. The terminal stage is characterised by the fever changing from quotidian to rtian type. It is sometimes characterised also by a steadily diminishing severity the fever attacks until, after some days, they fail to recur (so-called "spontaneous covery").

5. In 10 per cent of cases a primary attack of benign tertian malaria is a tertian ver throughout its course, and in about the same porportion of cases it is a tertian ver which soon changes into a quotidian fever. When a primary attack runs a clear rtian course from the beginning it is always advisable to enquire into the past istory of the patient with a view to ascertain whether he has previously had alaria.

6. By examination of the peripheral blood in a primary attack it is seldom or ever easy to correlate the course of the temperature with the stages of growth of the arasite; the temperature chart shows a sharp febrile attack recurring regularly very day, but blood examination shows parasites in nearly all stages of development. cases infected by only one bite of one mosquito the first parasites that can be found the peripheral blood are all at the same stage of growth. But even on the second third day following the first positive finding, parasites in several stages of growth re found; and this condition persists beyond the initial stage of the disease into, and ometimes almost throughout, the developed stage. It is curious and puzzling that a atient who has been infected with a pure strain of *P. vivax* by only one mosquito ite on only one occasion nearly always shows a quotidian type of fever in the deve-oped stage of the attack and that groups of parasites in different stages of growth are lways found. The quotidian type of fever does not mean that the parasites complete heir asexual cycle in 24 hours instead of in 48 hours. There is no reason to assume hat the fundamental 48-hour cycle of the benign tertian parasite does not hold good.

[1] Dr. P. C. Korteweg has published a complete account of the initial stage in benign tertian alaria produced by direct blood inoculation. The initial stage in the naturally produced disease eems to be very similar ("De Aanvangakoorts der Malaria Tertiana", *Ned. Tijds. v. Geneesk.*, ol. 68, 1924, Pt. I, No. 15).

Indeed, we believe that we have been able to demonstrate the 48-hour cycle of parasite from the earliest date of a positive blood examination. But we find t when films are taken frequently throughout the period of the first febrile paroxy which is characterised by a "rigor", it can be seen that some of the sporulat parasites are not quite so far advanced in their development as others; their grow has been a little slower than that of most of the parasites and therefore their "spo lation" occurs half an hour or an hour later than that of the bulk of the parasi For example, at 10 a.m. one may find that the bulk of the parasites are "sporulatin but that a few are still in the "pre-sporulating" stage, and at 10.50 one may find t the bulk of the parasites are in the form of very tiny rings, which have just entered corpuscles, but that a few are still only beginning to sporulate. The result of t relatively slower development of some parasites is that, after one or two febrile pa xysms, the blood picture, which at the first positive examination showed parasites only one stage of growth, now shows parasites in two or even three stages. The ir gularly remittent temperature characteristic of the initial stage of a primary attac probably the clinical expression of these different groups of parasites sporulating different times. Later, the two groups whose difference of growth is greatest (v young rings as compared with full-grown forms) usually become dominant a determine the character of the fever as a fever with a daily paroxysm. It can seen on most temperature charts of a primary attack that the height of the fever every other day is nearly equal, and that it is always higher, say, on the 1st and 3 than it is on the 2nd and 4th. This is the clinical expression of the two domin groups of parasites. Lastly, because the tendency in benign tertian malaria towards recovery and disappearance of parasites from the peripheral blood, the gro of parasites which is least numerous naturally disappears first. The result is th towards the end of the developed stage of the malarial attack only one group of pa sites is left and the temperature chart then shows true tertian periodicity. Lat two groups may again be found, but as a rule the chart retains its tert character.

7. A second attack resulting from a new infection by mosquito bites show clinical picture quite different from a primary attack. Even when a long inter (in our experience five months) has elapsed between the first and second infecti the second attack has the appearance of beginning with the terminal stage of the fi attack — that is, with a true tertian periodicity. There is little or no initial sta and no stage of quotidian fever precedes the stage of tertian fever. But the paras findings resemble closely those of a primary attack. On the first positive examinati only one group of parasites may be found, but a day or two later parasites of two three stages of development will be found at every examination. The temperatu chart, however, continues its true tertian character as if reflecting only that group parasites which is most numerous. After four or five typical tertian paroxysms may happen that a second group of parasites becomes reflected in the temperatu chart, which then changes from tertian to quotidian type.

8. A relapse usually has the clinical characters of a second attack, but the rasite findings differ in that gametocytes can be found earlier than in a fresh fection. For the treatment of general paralysis and other mental diseases the pinion is sometimes held that a "rigor" every other day is preferable to a "rigor" ery day. We find that the desired change from quotidian to tertian type can ually be effected by allowing the primary attack to run for four or five days, then opping it temporarily by one dose of from 3 to 5 grains (0.2 to 0.3 gramme) of inine and then waiting for a relapse. The relapse almost always will be a true rtian fever.

9. As would be expected, there are certain individuals in whom the course of the sease does not follow the general pattern outlined above. We have already referred this matter in the preceding section on susceptibility and immunity.

10. Up to the present I have not been able to come to a definite conclusion as to hether the duration of the incubation period of an attack or the severity of the tack is influenced significantly by the amount of the infective dose. This is surrising in view of accepted opinion on the cause of the severity of war malaria, as ell as in view of experiments with proteosoma infection of birds [1]. The purpose of e tests which I considered it necessary to make on this subject was to ascertain how st to induce the series of high temperatures on alternate days which are most ficacious for the treatment of general paralysis. Our patients are in the following ur groups: (*a*) those infected by the bite of one mosquito on a single occasion;) those infected by the bites of several mosquitoes (three to ten) on a single occasion;) those infected by the bites of many mosquitoes (up to 120) on a single occasion;) those infected by the bites of several or many mosquitoes on different dates ring the incubation period of the disease. It is true, of course, that even one avily infected mosquito injects more sporozoites than many scantily infected ones, t the results which I have in mind in this connection are based on instances in which the mosquitoes used were well infected. The difficulty of arriving at a definite nclusion on the subject is due to the fact that different individuals among the rticular class of patients with whom we are concerned react very differently to alarial infection. Possibly, as I have already mentioned, it would not be justifiable assume that similar results would be obtained among members of a healthier class the general population. A patient who has been infected by the bites of say 60, and 30 mosquitoes respectively on three occasions between August 29th and ptember 5th may have only a relatively mild attack with temperatures between

[1] Particularly experiments by Christophers, reported in "Malaria in the Punjab", *ientific Memoirs by Officers of the Medical Department of the Government of India*, New Series, . 46, 1911. Christophers found that, using scantily infected mosquitoes, even in great numrs, it was difficult to get a severe infection, but that, on the other hand, single heavily infected osquitoes often gave severe infections. But by using a number of heavily infected mosquitoes, t only was the incubation period reduced from nine days to five days but the resulting infecons of the birds were much more severe and death occurred in every case.

103° and 104° F. and a moderate parasite invasion, while another patient who has b infected by only one bite of one mosquito of the same batch may have a severe att with temperatures between 105° and 106° F. and a parasite invasion which has to stopped by quinine on the fifth or sixth day. As regards duration of the incubat period we have examples of periods as short as seven and eight days patients bitten by three and by ten mosquitoes respectively, as compared w examples of periods as long as 18 days and 17 days in patients bitten by 60 and mosquitoes respectively. Therefore it is not easy to state any general rule such has been stated by observers who have worked on the subject in relation to proteoso infection of birds. Our observations demonstrate again the importance of qualities possessed by the blood and tissues of the individual concerned. Neverthel we have ascertained in a few cases that a large dose results in a greater para invasion of blood corpuscles than a small dose and that a second infection at interval of between eight and twelve days after the first can be detected by an incre in the number of parasites following the expected date of onset of an attack due the second infection. But we do not find any significant indication of the sec infection in the temperature chart; it continues to show only the single daily rise temperature which was due to the first infection, and the height of the fever at e paroxysm is not appreciably changed. Nor have we observed up to the present t relapses are more frequent among patients infected by a large dose or on seve occasions than among patients infected by a smaller dose or on only one occasi We hope, of course, that with an increase in the number of our observations, shall be able to report more definitely on these points.

11. The incubation period of the naturally contracted disease, according to records, is most frequently twelve days, but there are nearly as many cases in wh the period is ten days. Ninety per cent of all our cases commenced to have fe before the 17th day after infection and nearly 70 per cent between the 10th and 1 days. The shortest incubation period was seven days, the longest twenty-three da Unless special arrangements are made to ensure that the temperature will be ta every four hours from about the tenth day it often happens that the initial feb manifestations of the attack are missed. As a rule we have not found paras in the peripheral blood until the second or third day after the first rise of temperatu

SUMMARY.

The purpose of the laboratory work described in this report is to fulfil official uirements relating to the treatment of mental diseases with a pure strain of the ıign tertian malaria parasite in mosquitoes. During the course of the work we have de some observations on factors concerned in the transmission of malaria from n to mosquitoes and from mosquitoes to man which are important both because y facilitate the work itself and because they can be applied to assist in solving blems of endemic and epidemic malaria in nature. In this concluding section, hall confine my remarks to the latter application of the observations.

1. An important result of our observations is that they indicate how small is chance that a particular brood of malaria-carrying mosquitoes in nature will r be concerned in transmitting the disease. It is probable that at least 95 per cent the potential malaria-carrying mosquitoes which emerge from the larval stage nature will never play that role, which is reserved for a few individuals whose life l be passed in a manner very different from that of the remainder of the brood. is conclusion is forced upon us when we consider how difficult it is, under the most ourable conditions, to bring even a few members of a large brood of mosquitoes a condition in which they will be successful transmitters of malaria. Our report largely concerned with the difficulties of this task, and it is certain that, in the ugher conditions of nature, no mosquito which does not overcome equal or greater ficulties will ever be a transmitter of the disease. Mosquitoes under favourable oratory conditions lead a sheltered life. They are protected against wind and n and against unfavourable changes of temperature; the food upon which they rive best and live longest is available without effort or risk, and care is taken to event the ingestion of a diet which is unsuitable or is contamined with bacteria moulds; when a mosquito refuses a meal it is separated from the rest of the batch d nursed at a lower temperature until it will feed. In nature, special conditions this kind cannot often be available, but I do not hesitate to affirm that in nature only mosquitoes which succeed in transmitting malaria are those rare individuals o happen to pass their life in conditions which resemble very closely those which have found to be essential for the successful transmission of the disease in experi-ental work. No one who fully appreciates the importance of this conclusion and cepts it as true can fail to regard anti-mosquito measures for dealing with malaria m a new point of view. He will at least realise what a great waste of effort is in-lved in measures directed against the breeding-places of mosquitoes as a whole, d even in similar measures directed against one species. He will begin to appre-ate how the secret of a successful control of malaria lies not in the general knowledge

that the disease is spread by mosquitoes of a certain kind, but in the particular exact knowledge of the life history of the few individual mosquitoes which suc in becoming transmitters of the disease.

2. A second important result of our observations is that even among the tively few anopheles which come to rest in a place which is favourable to their i tion not many will ultimately become infective. In this connection one of our o vations is that the presence of oöcysts in a mosquito's stomach does not inevit mean that the salivary glands will become infected, for we believe that in some vidual insects young oöcysts fail to come to maturity and disappear even whe insect lives long enough for their full development. For this reason we have n that reports of feeding experiments which are discontinued before sporozoites found in the glands are misleading. Other observations on this subject to w attention has been drawn in the report are: (1) the rarity of patients who are infectors of anopheles, (2) the fact that a patient in a primary attack is not infec until ten days have elapsed from the beginning of his illness (by which time he sh have been treated with quinine); (3) that, except in the rare instances of pat who are unusually good infectors of anopheles, the mosquito must feed several t on a patient in order to become infective; (4) that when the temperature is suffici high for the development of the parasites, the mosquitoes which harbour them have an opportunity of feeding every day; (5) that when the insects feed on ce fruit, as well as on blood, the probability that they will become transmitters of ma is much reduced, (6) that there are certain physiological factors and "cha factors which interfere with infection, such as the growth of the ovaries preve the infectious meal of blood from entering the midgut of the mosquito, the lo gametes by quick evacuation of the blood meal, and the situation of the ferti oökinetes in the mass of undigested blood in the mosquito's stomach.

Having regard to all these circumstances, and also to the factors of tempera and humidity, we must certainly regard malaria as a disease which does not sp unless a large number of special conditions are fulfilled. Our observations on t conditions help to explain why it is the general rule to find only a low percen of infected anopheles in nature and why malaria in nature is seldom or never contra except in certain houses or shelters where the above circumstances and condit pertain [1]. They fortify the opinion that malaria is essentially a household dis and particularly a disease of certain kinds of houses that fulfil the "laboratory co tions" which we have described. The reasonable inference is that malaria sh be dealt with in the houses of the people rather than in the environment [2].

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[1] A possible exception has been referred to on page 17. But this exception support view that the house is the "laboratory" where infection is bred.

[2] In connection with this view, which has been emphasised by our Commission in se reports, I find that STEPHENS and CHRISTOPHERS, working in Africa in 1899 and 1900, attention to it and gave some striking examples of "fever houses" in which infection pers for weeks or months (*Reports to the Malaria Committee of the Royal Society*, Series 1-8, 19 1903).

3. Since it is the case that in nature only a few anopheles become transmitters malaria, it may well be asked how it comes about that in many places all the abitants are infected with the disease. The answer is certainly given by the obserion that a mosquito which has succeeded in becoming infective retains its infecting ver for a long period and can infect many people. Different batches of our mostoes lived and continued to be infective for periods ranging from one month to ee months after the date on which sporozoites were present in their salivary nds. Some of the mosquitoes in these batches, after biting between 30 and 40 ients, still had numerous sporozoites in their glands. This was because the glands re replenished from time to time with sporozoites from oöcysts which ripened l ruptured at different times. In nature, a mosquito which has made its home a house containing several malarious children who are untreated has frequent portunities of becoming freshly infected; the result is that its stomach carries ysts in many stages of growth and its salivary glands are restocked with sporotes from time to time throughout the remainder of its life. The tabular statement en on page 12 indicates how dangerous a mosquito may be when it is conuously infective in this manner.

4. The observations which we record relative to the resistance of oöcysts and rozoites to cold, coupled with the observations on persistence of infectivity just ntioned, lead to the conclusion that benign tertian malaria can be carried through n a severe winter in hibernating mosquitoes. This persistence of infectivity through winter explains some of the occurrences in Northern Europe of primary attacks malaria during that season and in early spring.

5. On the subject of the infection of patients by the bites of mosquitoes, an eresting result in relation to the malaria problem in nature is the failure of some our patients who were bitten during the winter to develop malaria. This came a surprise, because throughout the summer there had been no failure. For reasons ted in the report I am not prepared as yet to prove that the failures were not to insufficiency of the infective dose. Therefore I prefer to postpone discussion them until a later date. If any patient who has not yet developed malaria as a ult of mosquito bites in November or December should develop an attack in the ing we shall know that the infection has remained latent in him throughout winter. Many examples of this "long latency" are recorded in the literature malaria in nature, but up to the present the matter has not been proved by laboory work. As yet the longest incubation period which we can record is 23 days. erefore we cannot yet add anything of value to existing explanations of the peculiar sonal curve of primary malarial incidence in Northern Europe, except, of course, observation recorded in paragraph 4 above.

6. We find that one attack of benign tertian malaria does not make a patient fractory to a second attack, though there is usually a striking difference between

the clinical type of fever in the two cases. This difference suggests that as a r
of an attack a patient acquires some quality which he did not previously pos
but the quality is not necessarily that of possessing "immune bodies". For va
reasons it seems worthy of enquiry whether some of the differences of "susceptibi
and of "resistance" to malarial infection among different individuals may be d
a relatively simple cause such as a slight modification of the normal chemical rea
of the blood or a change in its content of lecithin and other proteins.

7. Among clinical observations it is pointed out that in some respects the clas
description of benign tertian malaria cannot stand, and some of the points w
merit consideration in framing a new description of the disease are noted. No def
conclusion is reached as to whether the severity of an attack is influenced significa
by the amount of the infective dose injected by mosquitoes.

Standardisation of Sera, Serological Reactions and Biological Products:

- Report on the International Conference on the Standardisation of Sera and Serological Tests, convened by the Health Committee of the League of Nations and held from December 12th to 14th, 1921, at the British Ministry of Health, London. (French and English texts.) (C. 533. M. 378. 1921. III.) . . . 1/6 — $0.30
- Report on the Second International Conference on the Standardisation of Sera and Serological Tests, convened by the Health Committee of the League of Nations and held from November 20th-26th, 1922, at the Pasteur Institute, Paris . . . 1/– — $0.25
- Report on Serological Investigations, presented to the Second International Conference on the Standardisation of Sera and Serological Tests held at the Pasteur Institute in Paris in November 1922 . . . 5/– — $[illegible]
- Report on the European Health Conference held at Warsaw from March 20th-28th, 1922 . . . 1/6 — $0.30
- Report of the Technical Conference for consideration of Certain Methods of Biological Standardisation, Edinburgh, from July 19th-21st, 1923. . . . 4d. — $0.05
- Investigations on the Serodiagnosis of Syphilis. Report of the Technical Laboratory Conference held at Copenhagen, November 19th to December 3rd, 1923. (Two Annexes.) (C. [illegible] M. 5. 1924. III. C.H. 148.) . . . 3/6 — $[illegible]

Malaria:

- Malaria Commission: Report on its Tour of Investigation in certain European Countries in 1924. (C.H. 273.) . . . 6/9 — $1.60
- Deux rapports sur le paludisme en Asie Mineure, en Syrie et en Palestine présentés par le Docteur Ernest Basso (Smyrne) et le Docteur A. Bentmann, Conseiller médical de régence. (C.H. 275.) (In French only.) . . . 6/9 — $1.60
- Malaria Commission. Reports on the Tour of Investigation in Palestine in 1925. (C.H./Malaria 52.) . . . 3/- — $0.70

Epidemiological Investigations:

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LEAGUE OF NATIONS

Health Organisation

THE BIOLOGICAL STANDARDISATION OF INSULIN

INCLUDING

REPORTS ON THE PREPARATION OF THE INTERNATIONAL STANDARD AND THE DEFINITION OF THE UNIT

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Publications of the League of Nations

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1.

INTRODUCTION

By H. H. Dale

(National Institute for Medical Research, London).

Two International Conferences convened by the Health Organisation of the League of Nations have been held on the standardisation, by biological methods, of certain therapeutic agents other than sera and bacterial preparations. Of the substances which came under discussion at these two Conferences, the remedy most recently introduced into therapeutic practice was insulin. It is especially gratifying, therefore, that international agreements with regard to the standard for this remedy, and to the methods of applying that standard in biological assay, were so quickly and easily reached, at so early a stage in the history of its practical use.

The earlier Conference, which met in Edinburgh in 1923, discussed the various methods which, at that time, had already come into use for testing preparations of insulin, and for expressing their activity in units, defined in terms of some measurable animal reaction. The Conference decided unanimously that the unit for general acceptance should be that laid down by the Insulin Committee of the University of Toronto, in terms of the production of a stated degree of hypoglycæmia in rabbits. It was clear, however, that there was little likelihood that a unit so defined would have and maintain the requisite uniformity when determined in different institutions in a number of different countries, on animals kept under different conditions. It was further obvious that much time must elapse before general uniformity could be expected as to the details of conduct of the test, and even as to the species of animal used. The Conference therefore decided that the most effective method of defining and stabilising the unit would be to arrange for the preparation of a quantity of insulin in a dry and stable form. The unit, as previously accepted, was to be carefully determined in terms of this standard preparation, and then re-defined in terms of an exact weight of the same. The standard preparation would then serve as a convenient currency, by means of which the unit could be transmitted to every country concerned, each institution being left to use, for measurement with reference to the standard, the

particular species and method in which individual experience gav confidence.

By the middle of 1924, the preparation of the dry, stable standar had been completed at the National Institute for Medical Researcl London. Contributions of insulin for this purpose had been gen rously made by five different institutions concerned with th manufacture of insulin on a large scale, viz., the Connaugl Laboratories of the University of Toronto, Eli Lilly & Co. (India napolis), the British Drug Houses, Ltd. (London), Burrough Wellcome & Co. (London), and the Nordisk Insulin Labora torium (Copenhagen), through Professor A. Krogh. Each contr bution was approximately 100,000 units, so that roughly 500,00 units were available as the raw material for the standard prepar tion. The details of the procedure adopted for reducing the who of this amount to the form of a uniform, dry, stable and perfectl soluble powder are given in the note by Dr. Dudley.

During the latter part of 1924, samples of this standard prepar tion were distributed to a number of laboratories, with the obje of obtaining a series of independent estimates of its value, in term of the units current at the time in different countries, and of th measurements of that unit in use in the different laboratories. Th different reports received are here collected, and with them a embodied two reports, by Professor Macleod and Mr. Orr, and b Dr. Hemmingsen and Professor Krogh respectively, which, thoug not dealing directly with the assay of the international standar preparation in terms of the previously current unit, present i detail, and afford valuable material for the discussion of, two widel used methods for the biological measurement of insulin.

The results from the laboratories which report on the values c the international standard material, in terms of their previou conceptions of the unit, show a satisfactory and even remarkabl concordance. The following are the values assigned to the standar preparation by the five laboratories which determined its valu quite independently, and by the use of the different method described in the individual reports.

	Number of units estimated to be pre sent in 1 mgm. of th standard preparatio
Insulin Committee of the University of Toronto	8.5
Lilly Research Laboratories (Dr. Clowes)	8.5
Squibb & Sons' Research Laboratories (Dr. Anderson) .	8.4
Wellcome Physiological Research Laboratories (Dr. Trevan)	8.8
National Institute for Medical Research (Mr. Marks) . .	8.8

On the basis of these determinations, the Insulin Committee c the University of Toronto decided that, to avoid fractional calcula tions, it would be desirable to regard the standard preparation a containing 8 units per mgm., and accordingly to define the unit c

nsulin as "the activity contained in 0.125 mgm. of the international standard preparation".

This recommendation was presented to the second International Conference, which met in Geneva in September 1925, together with memoranda from different laboratories concerning the available biological methods for comparing other preparations with the standard. The Conference placed on record the following unanimous recommendations:

"1. That the dry preparation of insulin hydrochloride, prepared by the Medical Research Council of Great Britain at the request of the Edinburgh Conference, should be accepted as the international standard preparation of insulin. That 1 mgm. of this standard contains 8 units of insulin (or 1 unit = 0.125 mgm.), as provisionally defined by the Insulin Committee of the University of Toronto.

"2. That this standard preparation be kept, on behalf of the Health Organisation of the League of Nations, by the Medical Research Council, who will undertake to test the permanence of its potency from time to time.

"3. That samples of this preparation, weighing 0.100 gram each, be sent to some responsible organisation in each country (such as an Insulin Committee or a Government institution), who will undertake further distribution to testing laboratories. In those countries in which no suitable organisation for this purpose exists, samples of the standard will be distributed by the Medical Research Council after consultation with the Insulin Committee of the University of Toronto, or, in case this Committee be discontinued, with one appointed by the Health Committee of the League of Nations.

"4. That each testing laboratory should prepare a standard of its own, and should compare the potency of this with the sample of the international standard placed in its hands for this purpose. When the latter is exhausted, further comparisons with the international standard should, where possible, be undertaken by the responsible authority for the particular country.

"5. That either of the following methods be considered as suitable for the bio-assay of insulin:

"(a) *Methods depending on the effect on blood-sugar.*

"*First method.* — Varying quantities of insulin that are less than the convulsive dose are injected subcutaneously into rabbits of about 2 kilograms body-weight, from which food has been withheld for 18 to 24 hours, and the average of the blood-sugar percentages over a period of five hours after the injection is subtracted from the blood-sugar percentage immediately preceding the injection. The number of units of insulin present in each cubic centimetre of the preparation is then calculated by use of a

formula (see report). Each rabbit used in the assays i tested at suitable intervals with a standard preparatio which is periodically compared with the internationa standard.

"*Second method.* — Alternatively, one-half of a series o rabbits receives, in each case, an injection of a half unit o the standard preparation per kilogram, and the other ha receives, on the same day, the dose supposed to be equ valent of the sample under test. The percentage fall o the blood-sugar content over a period of five hours is deter mined as above. A few days later the determinations ar repeated on the same series of rabbits in this way, that th rabbits previously receiving the standard preparation no receive that under test and *vice versa*.

"From the relation between the falls of blood-sugar con tent produced, on the one hand, by the standard prepara tion and, on the other hand, by the sample under test, th true activity of the latter in units per cubic centimetr can be calculated. (See separate report.)

"(b) *Method depending on the incidence of symptoms i white mice.*

"The assay is carried out by comparison with a standar preparation injected simultaneously with the unknow sample on an equal number of mice from a common stock The onset of convulsions or collapse is used as the end poin of the reaction and a mouse dose is the quantity producin convulsions (or collapse) in half the number of mic injected. During the test the mice are kept in a incubator at a uniform temperature of not less than 30° C (For details of these methods, see separate reports.)

"6. That the Conference appoint a Sub-Committee, whic shall submit recommendations with regard to the permissibl content of organic solid matter per unit in preparations o insulin and with regard to tests for the stability of suc preparations.

"7. That, in future, the term 'unit of insulin' or 'insulin unit should only be used in the sense indicated above."

It is to be hoped, and expected, that these recommendations wi be generally adopted, and that the "unit" of insulin will hencefor ward have a uniform and worldwide significance, in scientific litera ture and practical therapeutics alike, so that the risk of confusio between the so-called "physiological" and "clinical" units may b avoided.

2.

PREPARATION OF THE INTERNATIONAL STANDARD INSULIN

By H. W. Dudley

(National Institute for Medical Research, London).

Of the five approximately equivalent contributions of insulin for the preparation of the international standard, those from the Connaught Laboratories of the University of Toronto and from Messrs Eli Lilly & Co. were in the form of solutions, similar to those issued for therapeutic use, and containing approximately 20 units per c.c. Those from Professor Krogh, from the British Drug Houses and from Messrs Burroughs Wellcome & Co. were in the form of dry powders. The following is an outline of the procedures adopted, which followed the general lines of the process described by Dudley and Starling (*Biochem. Journ.* 147, 18, 1924).

1. *For the fluid preparations.* The procedure was identical in both cases and description may be given of one in which the volume of original solution was 6,250 c.c.

Sodium carbonate was added cautiously to the solution until the appearance of a faint, permanent turbidity indicated that the reaction had reached the neighbourhood of the isoelectric point of the insulin. A saturated watery solution of picric acid was then added until no further precipitate was formed, the total quantity added being 650 c.c. The precipitate was allowed to settle completely and the clear supernatant fluid withdrawn by means of a siphon. The moist precipitate was then stirred up with 6 litres of distilled water, with the addition of 300 c.c. of saturated aqueous picric acid, and was allowed again to settle. This washing was repeated, the bulk of the supernatant fluid was siphoned off, and the washed picrate was separated from the remainder by use of the centrifuge. The moist picrate was then dissolved in 375 c.c. of a mixture of 1 part of concentrated watery hydrochloric acid with 9 parts of absolute alcohol. The solution so obtained was centrifuged, to remove a small amount of material insoluble in the acid alcohol, and was then poured into 4.5 litres of dry acetone. The hydrochloride thus precipitated was filtered off, washed with successive small quantities

of dry acetone and dry ether, until perfectly free from all traces o picric acid, and then dried in a vacuum desiccator over stron sulphuric acid.

2. *For the dry preparations.* These were dissolved separately in from 5 to 6 litres of water in each case. In one case, dilute hydro chloric acid was added to assist solution, and a residue not imme diately soluble in this was repeatedly extracted with very dilute acid until no more dissolved, these extracts being added to the main bulk The further procedure was similar to that adopted for the fluid pre parations. The reaction was adjusted to the neighbourhood of th isoelectric point, and the insulin was precipitated as a picrate, whicl was washed, collected, and converted into a dry hydrochloride a above.

Five different quantities of insulin hydrochloride were thus ob tained, and since these varied in activity, according to approximat determinations made by us, from about 6 to 13 units per mgm., i was decided, in order to ensure perfect uniformity of admixture an complete solubility of the final product, to put the whole of the fiv batches together into solution again, to precipitate them as a uni form picrate, and to reconvert into a single batch of hydrochloride The process used was exactly similar to that already described. Th treatment of the large total quantity involved the use, in the earlie stages, of containers and apparatus of larger dimensions than thos usually available in a research laboratory. By the kindness o Mr. F. H. Carr, we were given facilities for carrying out this re precipitation in the laboratories of the British Drug Houses, Ltd With his help, and that of his technical assistants, the process o converting the total quantity of insulin into picrate and back int hydrochloride was carried out twice in succession. The perfectl white and soluble powder so obtained, representing the mixed acti vity of the five original consignments, was dried *in vacuo*, over P_2O_5 It was then distributed into ampules, and again dried *in vacuo* ove P_2O_5 until the ampules became constant in weight. They were the filled with dry nitrogen and hermetically sealed. In this form th international standard insulin is preserved in a refrigerator at th National Institute for Medical Research, and distributed in accor dance with the recommendations of the International Conference

3.

THE PRINCIPLES INVOLVED IN THE BIO-ASSAY OF INSULIN

By J. J. R. Macleod and M. D. Orr

(From the Physiological Laboratories and the Insulin Committee Laboratory of the University of Toronto).

When it was discovered that insulin lowers the blood-sugar in normal rabbits and that a parallelism exists between the degree of hypoglycæmia and the therapeutic effects of insulin in *diabetes mellitus*, it was recommended that the pharmacological assay of this hormone should be based on the rabbit test (Banting, Best, Collip, Macleod and Noble). The first question to be considered concerned the definition of a unit and, since it was observed that the great majority of the injected rabbits developed characteristic symptoms when the blood-sugar had been lowered to about 0.045 per cent, it was decided to define, as one unit, that amount of insulin which has this effect. Since the earlier experiments on rabbits were not primarily performed for the purpose of determining the strength of the insulin, they were not carried out with the necessary precautions involved in such work and it was soon found, when assays had to be made for clinical purposes, that several standard conditions would have to be laid down in order to obtain results of practical value.

It was apparent that rabbits taken from stock at random responded with marked variability to equal quantities of the same preparation of insulin, and it was presumed that this depended on (1) differences in weight, (2) differences in the amount of glycogen present in the liver. The requirements were therefore made that only full-grown animals of approximately 2 kilograms should be employed and that food should be withheld from them for 18 to 24 hours before injecting the insulin. Although it was realised that starvation for so short a time would not insure complete removal of glycogen from the liver, it was considered that it would bring the amounts to a tolerably uniform low level in the different animals. The adoption of these requirements materially increased the dependability of the assays, but there still remained the serious difficulty of knowing at what interval after injecting insulin blood should be removed to determine the extent to which the sugar had become lowered. It was found that greatly varying quantities of insulin caused practically equal degrees of hypoglycæmia up to between 30 and 60 minutes after injection and that recovery of the blood-sugar at later intervals was only approximately proportional to

these quantities (McCormick, Macleod, Noble and O'Brien). I
some animals the blood-sugar might continue in its downwar
course after the preliminary fall, while in others it might commenc
to rise again, although the doses of insulin were the same. Thi
irregularity was manifest when the insulin was given both sub
cutaneously and intravenously, so that it could not be dependen
upon inequalities in the rate of absorption. In view of these irre
gularities it was impossible to know when the animal should b
bled in order to determine the greatest degree of hypoglycæmia
This raised the question of basing the assay not on determinatio
of blood-sugar but on the incidence of convulsions, but, since i
soon became apparent that these may not supervene in starve
animals until the blood-sugar has fallen considerably below 0.04
per cent, the level at which they usually occur in fed ones, the metho
was not adopted.[1]

Other reasons for discarding the incidence of symptoms as th
basis of assay were (1) that such a method can give no indicatio
of the duration of the hypoglycæmia; (2) that there is considerabl
variability in the tendency of different animals to develop them whe
the blood-sugar is lowered; this makes necessary the use of ver
large numbers of rabbits and the method is therefore a costly one

In using the extent of the lowering of blood-sugar the difficult
was encountered of knowing at which period after the injection th
blood samples should be taken. It was decided, therefore, to bas
the assay on the average lowering of blood-sugar over a period
following the injection of insulin, that was sufficiently long t
allow for recovery to the normal level when quantities sufficien
to bring it almost to the convulsive level had been given. Sinc
this appeared to be about five hours in the great majority of animal
and since the lowest level following a convulsive dose was usuall
reached in from 60 to 90 minutes, it was decided to take the bloo
samples at one and a-half and five hours, along with a third on
at three hours.

Since it was stated by those engaged in the clinical investigation
that less than one unit of insulin, as originally defined, might b
adequate in the treatment of certain cases of *diabetes mellitus*, i
was decided to divide this unit by 3, one unit being now considere
as one-third of the amount which could lower the blood-sugar t
the convulsive level.[2] At this stage an Insulin Committee wa
appointed by the University of Toronto and a special laborator
was equipped for assaying samples of the insulin manufactured fo
sale by the firms licensed to do so under the protective patents whic
had been assigned to this University by the discoverers.

In July 1923 the problem was discussed by the Standardisatio
Committee of the League of Nations (Edinburgh meeting), by whon
it was recommended that one unit of insulin should be considere

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[1] Further references will be made later to the application by others o
methods carried out according to this principle on rabbits, mice or rats.

[2] There was some temporary confusion at this stage, due to other fraction
than one-third being also suggested.

s that amount which is capable of lowering the blood-sugar to he convulsive level, within three hours, in rabbits of approximately kilograms weight from which food had been withheld for 24 hours. Various methods for carrying out the assays were presented and liscussed at this meeting but, in view of the limited experience with insulin which had been possible at that time, it was decided not to recommend any particular procedure for conducting them. The Committee at the same time accepted the offer made by H. H. Dale, on behalf of the National Institute for Medical Research, to supply a dry preparation of insulin hydrochloride in sufficient quantity to serve as an international standard, with which the standards in use in other testing laboratories could be compared.

During the two years intervening since the above recommendations were made, the exact procedure adopted for the assay have varied somewhat in different laboratories. In Canada and the United States, where all the firms manufacturing insulin for sale are under licence by the University of Toronto, the procedure adopted by the Insulin Committee has been employed, at least for the final assays, although others have been used in routine work. The details of this procedure and the evidence of its practical value will be found in the report by the Insulin Committee. In Great Britain the Medical Research Council has adopted a method which differs from that used by the Insulin Committee of Toronto, in that more reliance is placed on comparison with a standard preparation (*vide* Report). In Holland the method commonly used (University of Amsterdam) is based on the behaviour of the blood-sugar, but consideration is also taken of the incidence of convulsions, the minimal convulsive dose being taken as that which lowers the blood-sugar to 0.045 per cent, or produces convulsions in 75 per cent of the injected (standardised) rabbits in two or four hours after injection. In Scandinavian countries, the assay depends on the incidence of convulsions in white mice which have been fed on a standard diet and are kept after injection with insulin at a temperature of not less than 28°C., one mouse unit being considered as that amount of insulin which causes convulsions in 50 per cent of the injected animals within two hours.

Before discussing some of the principles involved in the Toronto method, it may be well to give the reasons why the incidence of symptoms was not adopted as the basis of its method of assay. The chief of these have already been given in the introduction and the others are:

(*A*) Some preparations of insulin—for example, those prepared from the pancreas of the Elasmobranchi or the principal islets of the Teleostei—may apparently cause symptoms which are more severe and more lasting than those from mammalian pancreas although the effects on blood-sugar are similar (Macleod and Orr).

(*B*) In insulin prepared from mammalian pancreas, the tendency to cause symptoms when the blood-sugar has reached 0.045 per cent has diminished as the methods of manufacture have improved and purer preparations have come into general use. This has been particularly well shown by Grevenstuk and Laqueur, who have

compared the proportion of rabbits showing symptoms at th convulsive level with those not showing them for ten consecutiv periods extending over one and a-half years. Whereas abou 96 per cent of the rabbits showed convulsions at 0.045 per cen blood-sugar during the first period, only 41 per cent showed then in the last one, and in the intervening periods the proportio showing symptoms steadily decreased.

(*C*) Sometimes convulsions, or symptoms closely resemblin them, appear before the blood-sugar has reached the convulsiv level (*cf.* Macleod and Orr, Grevenstuk and Laqueur, Bornstein and Delezenne).

Although most authorities are agreed that there is no accurat correspondence between the degree of hypoglycæmia and convulsiv symptoms, a contrary opinion (namely, that these practically alway appear at a blood-sugar of 0.045 per cent) has been expressed b Depisch, Högler and Überrack.

(*D*) There is some doubt as to whether the symptoms are directl dependent on the lowering of blood-sugar; they may be caused b some other factor which can act only after a certain degree o hypoglycæmia has become established. It is thereotically possibl that changes in this factor might occur independently of changes i blood-sugar, although the remarkable promptitude with which th symptoms can be antidoted by glucose, both in the hypoglycæmi caused by insulin and in that following hepatectomy (Mann an Magath) does not lend support to this view.

(*E*) Because the incidence of symptoms must depend not onl on the degree of hypoglycæmia but also on the varying susceptibilit of different animals to their occurrence, it becomes necessar to employ very large numbers of animals in arriving at an assay Although the animals can be saved for use in subsequent assays b the prompt injection of glucose, the method is a very expensive one On account of this difficulty, Krogh and Fraser have recommende that white mice, after careful preliminary dietetic treatmen followed by a short period of starvation, should be used. When thes animals are kept at a temperature of not less than 28°C. after injec tion, and sufficient numbers are observed, there is no doubt tha fairly accurate assays can be obtained, and the method is to b recommended as a useful control one.

(*F*) The method, depending on symptoms, at best only indicate whether the blood-sugar has reached the possible convulsive leve and it gives no information with regard to the duration of th hypoglycæmic effect.

(*G*) For therapeutic purposes, it is not the convulsion-producin properties of insulin that are of importance, but its effects o carbohydrate metabolism, as reflected in its action on the blood sugar.

Turning now to the method used by the Insulin Committe of the University of Toronto, and to the practical details, whic are given elsewhere in the present report, the following genera principles may be considered:

1. *The preliminary treatment of the animal.*

Full-grown rabbits weighing about 2 kilograms (with variation of 200 grams above or below this weight) and showing no evidence of disease are chosen. They are kept for some days, before being used for assay, on a diet of oats and hay. The importance of diet has been studied particularly by Page, by Abderhalden and Wertheimer and more recently by Tiitso. No particular attention is paid to colour or race [1], since these factors have not been found by us to be significantly correlated to the effect of insulin (see also Grevenstuk and Laqueur, *loc. cit.*). The temperature of the stock-room is kept as uniform as possible, since there is no doubt that temperature has a considerable influence, but the greatest care in this regard does not eliminate a variability in response to insulin which is dependent upon the season, the same rabbits being decidedly more susceptible in summer than in winter.

2. *The frequency with which the same animal may be used.*

There is no reason to believe that animals injected every day with sub-convulsive doses of insulin give results which are demonstrably different from those obtained when intervals of several days intervene between the injections. Miss O'Brien injected several rabbits daily, with the same doses of insulin, for several months and examined one sample of blood from each animal practically every day, and, apart from an ultimate diminution in susceptibility which developed towards the end of the observation, she could not detect any variability in the degree of hypoglycæmia that was produced. For the first week or two the body-weights of the animals increased markedly, apparently because they became very hungry and ate more, but later the weights declined again and became tolerably steady. The doses of insulin were sub-convulsive. In other observations made both by us and by other observers it was found that the rabbits became very fat when convulsions requiring injections of glucose were frequently induced. This is contrary to the finding of Clough, Allen and Root that daily injections cause death of the animals. It is undoubtedly safe to use the same rabbits once a week and this is the practice in Toronto and also in Holland. In England they are used every four to five days. The intervals should not be shorter than this because of possible harm from the loss of blood. The same animal may be used for three months or longer, the usual causes for discarding being as follows:

(*a*) The vessels of the ears become difficult to bleed from; (*b*) the response to insulin becomes less marked; (*c*) the body-weight comes to vary beyond the permissible limits (2,000

[1] It is possible that strict assortment according to race might bring about greater uniformity in the effects on different rabbits, but such assortment is impracticable under present conditions. That race may play a role is indicated by the failure to obtain similar results on Himalayan rabbits as on English ones with the same preparation of insulin.

grams $\pm$ 200 grams). Convulsions are avoided as far a possible, but if they occur glucose is not injected unless the continue and coma supervenes, endangering life. It is remark able how frequently the animals may exhibit these symptom without danger to life.

3. *Method of injection of insulin.*

Since the difference between assays made after intravenous an subcutaneous injection is not pronounced, the more convenien subcutaneous method is preferred, and it is quite unnecessary, i applying it, to use any aseptic precautions, as has been prescribe by Clough, etc. With regard to the grading of doses and the con centration and volume of the insulin solution, it will be noted, i the specifications of the Toronto method, that each of three rabbit is injected with 1 c.c. of a solution containing as nearly as possibl 2.5 units of insulin (just short of a convulsive dose), each of anothe group of three being injected with 0.8 c.c. of the same solution equalling, therefore, 2 units, and each of a third group of three, wit 0.6 c.c., equalling 1.5 units. The concentration of insulin injecte into all nine animals is alike and presumably, therefore, the rate of absorption will be equal. This will cause equal effects on th blood-sugar of the different rabbits to start with, and the differenc due to variable doses will be manifested in the duration of the effects This procedure was adopted since it was not found possible to detec any proportionality in the extent of the initial fall of blood-suga and the amount of insulin injected, unless—and then even onl approximately so—very small doses were used (Macleod and Orr) The initial effects of insulin appear to obey the "all or none prin ciple". The objection to using such small doses as would show these initial differences was that the final results became ver inconstant, which may be accounted for by variability in the interna secretion of insulin from the pancreas of different animals.

The alternative method of injecting equal volumes of insuli solutions of varying concentrations was used at one stage of th assays, but was abandoned in favour of the present method, becaus this yielded decidedly more dependable results. The reasons fo this may be, either (1) that the insulin is so slowly absorbed int the blood from very dilute solutions that it never reaches the thres hold necessary to cause any effect on the blood-sugar, or (2) tha with slow absorption of small traces there is a shutting-down o the internal secretion of insulin from the pancreas, or in the respons of other ductless glands concerned in the regulation of carbohydrat metabolism. Grevenstuk and Laqueur have given special atten tion to this question of the threshold dose of insulin and have pointe out its application in the use of insulin in man.

The necessity for determining the normal blood-sugar before injectin insulin.

This is necessary since considerable variability occurs in differen animals, and a certain degree also occurs in the same animal o

ifferent days. Scott and Ford and Eadie found the mean blood-ıgar of 24 starved rabbits to be 0.117 per cent, with variations all ıe way from 0.068 to 0.177. In Murlin's laboratory the mean was ›und to be 0.105 with variations from 0.071 to 0.143, and Grevenstuk nd Laqueur found the mean to be 0.138 and the extremes 0.040 nd 0.525.

Since the calculation of the results in the method of assay at resent under discussion involves subtraction of the blood-sugar ollowing the injection of insulin from the normal, it is therefore bsolutely essential that the latter be determined for each animal. n the modified method of assay used by Grevenstuk and Laqueur his is not considered to be essential, because, it is stated, that equal oses of insulin, within wide limits, cause the blood-sugar to fall o the same absolute level whatever the normal may have been efore injection. This has not been our experience, although it is robably the case that the extent of the fall is relatively greater vhen the normal blood-sugar is high.

The frequency of bleeding after injecting insulin.

The first blood after the injection is taken in one and a-half ours, since it was found after about this interval that the sugar as usually reached its lowest level and that the effect of insulin n counteracting the hyperglycæmia caused by injecting glucose s most pronounced (Eadie and Macleod). The last blood is taken n five hours, because with subconvulsive doses of insulin the blood-ugar has usually returned to the normal by this time. A third ample is taken in three hours, so as to give an intermediate point n the curve. To a certain extent the choice of these intervals is rbitrary and we do not place much emphasis on the importance of following them. It might be possible to arrive at a satisfactory ssay if one could depend on one sugar estimation made on blood aken when the lowest level was reached, but it is impossible to now when this occurs. It is necessary, therefore, to take several nd to gauge the hypoglycæmic effect by taking the average of ll of them. Another important advantage in this procedure s that it takes into account the duration of the action of insulin. It is of undoubted importance that this should be done, for we have onstantly noted that insulins prepared by different methods may vary considerably in the duration of their hypoglycæmic effects. We cannot say whether this bears a direct relationship to the preparations, but it is certain that impure ones, such as those first manufactured, have more prolonged effects than highly purified ones.

It is, of course, recognised that the level of the blood-sugar during the recovery stages will depend as much on the extent to which sugar is mobilised from the glycogen stores of the liver, etc., to compensate for the hypoglycæmia, as upon the dose of insulin, and it is on this account that these stores are reduced by preliminary fasting. To minimise the error thus incurred, attempts were made to render the liver entirely free of glycogen by means of more prolonged starvation and the use of epinephrin or phlorhizin, but

without it being possible to observe any material increase in accu
racy of the assays. A very considerable saving of time, without an
material loss in accuracy, can be effected by making one suga
titration on the mixed filtrate of the three blood samples, instea
of titrating each separately and then averaging the results. Eac
blood must have the precipitating re-agent (Folin-Wu) added to
as it is withdrawn, but when all have been collected they may b
mixed and filtered through one filter paper or each may be filtere
separately and equal portions of the filtrates mixed before dete
mining the sugar. The latter procedure is that preferred in th
Insulin Committee Laboratory.

The evaluation of the results.

It is recognised that the equation [1] used in calculating the resul
(see report of Insulin Committee) is very largely an arbitrary on
but nevertheless it has proved to be distinctly useful in practic
Certain parts of it demand closer attention. By using as the valu
of "*a*" the difference between the normal blood-sugar and th
average level attained during five hours after injecting insuli
two fallacies are incurred.

In the first place, it is assumed that the extent of the lowerin
of blood-sugar bears a linear relationship to the dose of insuli
This cannot obviously be the case, for not only must allowan
be made for the amount of insulin required to reach the threshol
as has already been pointed out, but also, without taking into regar
the threshold principle, the effect of two units must be less than tha
of one unit multiplied by two, and this progressive diminutio
in effect must become more and more pronounced as the numbe
of units is increased. As a matter of fact, when the number
units administered and the value of "*a*" are plotted against eac
other, a curve is obtained. With very small doses the curve
relatively steep and there is more nearly a linear relationship betwee
units and "*a*" than with larger ones when it bends towards th
abscissa and then gradually becomes more nearly parallel wit
it. Greatest accuracy should therefore be obtained when ver
small doses of insulin are injected, but, as a matter of experienc
it has been found that the effects on the blood-sugar under thes
conditions are subject to great irregularity (perhaps partly becaus
of variations in the amount of endogenous insulin present in th
animal and partly because of the threshold phenomena), so that
is very difficult to obtain results which agree within the permissib
limits which, as will be explained later, it has been found necessar
to adopt. The actual method which is employed to attain th
will be found in the report of the Insulin Committee.

A second inaccuracy in evaluating "*a*" by the present metho
depends on the fact that it represents the *average* extent to which th
blood-sugar is lowered instead of the *lowest point* which this reach

[1] The equation is $\frac{a}{b} \times \frac{w}{c} \times 1.5 =$ number of units per c.c.

within five hours. In this regard, the results obtained by use of the equation do not conform with the definition of the unit recommended at the Edinburgh Conference of this Committee. But no method depending on measurement of blood-sugar could strictly fulfil the requirements of this definition, for it is, in practice, impossible to know when the blood-sugar reaches its lowest point after insulin. In 90 minutes, for example, the blood-sugar may still be falling in one animal, whereas it is rising in another. It might be possible to meet this objection by taking blood-sugars at more frequent intervals—every 30 minutes, for example—and to use in the calculations the lowest result obtained. Apart from the technical difficulties in doing this, there remains the objection, that in the result so obtained no allowance would be made for the duration of the hypoglycæmia, and we are satisfied that this is a fact which should be taken into consideration in the final assay. Comparison of samples of insulin manufactured by different firms and assayed by us has revealed a considerable variability in the duration of the hypoglycæmic effects. For clinical purposes, it might be of value to distinguish between quick-acting and slow-acting insulins, but until some such classification is made we consider it advisable that some allowance be made for duration of effect in the final assay.

The value "b" represents the standard unit and is obtained by subtracting 0.045 from the normal blood-sugar. It is the metre-stick for the measurement of the units and might equally well have been any other value, 0.045 being chosen since the large majority of the (fed) rabbits used in the earlier experiments develop characteristic symptoms at this level.

The value "w" (the weight of the rabbit) is not allowed to vary from 2 kilograms by more than 0.2 kilograms, and within these limits there is practically a direct relationship between dose and effect. Stross and Wiechowski and Fenger and Wilson (*cf.* Grevenstuk and Laqueur) and Blatherwick and others have confirmed this. Beyond these limits it is stated by Walters that the dose required to cause convulsions is proportional to the square of the body-weight, a rabbit of 2 kilograms requiring four times as much insulin as one of 1 kilogram.

Methods of Assay based on Principles other than the Behaviour of the Blood-Sugar in Normal Rabbits.

The results obtained by the foregoing and by other methods of assay vary considerably among different animals even when these are of the same species and are treated alike in every regard. Various attempts have been made, both by us and by numerous others, to devise more precise methods. It would be of no advantage to describe these in detail here, but a brief reference to those which have been investigated in the Physiological Department of the University of Toronto may not be out of place, along with a statement of the principles under which they were attempted. Since, as already explained, the curve expressing the relationship between the dose of insulin and the value of "a" is a steep one only

when very small doses are used, it was considered possible that a more extended simple relationship might be obtained by increasing the amount of blood-sugar on which the insulin could act. This was done by injecting glucose subcutaneously (2 grams per kilogram) in 75 minutes after varying doses of insulin, it having been found by experiment that the effect of the insulin in diminishing the hyperglycæmia is most marked after this interval of time (Eadie and Macleod and Bouckaert and Stricker). A thorough trial of this method of assay was subsequently made in the Insulin Committee Laboratory, but it was not found to be of practical value.

Another method involving the same principle consisted in matching the hypoglycæmic effect of insulin against the hyperglycæmic effect of epinephrin. Although an interesting relationship was observed to exist, there was clearly no greater constancy in the results than in those obtained by the usual rabbit method (Eadie and Macleod, *loc. cit.*).

The variability in reaction towards insulin of different animals that have been treated exactly alike with regard to diet is probably dependent on the following factors: (*a*) varying amounts of insulin produced by internal secretion in the injected animal; (*b*) the influence of hormones from other ductless glands than the pancreas acting on carbohydrate metabolism; thus, as has been suggested by Bodansky, Burn and Marks, etc., the thyroid gland may be concerned; others have thought of the adrenals.

In order to eliminate the varying internal secretion of insulin from the pancreas, a thorough investigation was made by F. N. Allan of the possibility of assaying insulin in terms of its influence on the carbohydrate balance of completely depancreatised dogs. This was chosen, rather than the effect on blood-sugar, partly because of the practical difficulty of taking frequent samples of blood from dogs and partly because it was considered that evaluation of insulin in terms of glucose equivalents would be of practical value in clinical practice. Dr. Allan conducted these investigations with great skill and diligence and found that, although there is a very close relationship between dose and effect, this is not the same at different levels of carbohydrate balance, one unit of insulin causing many more grams of glucose to be metabolised when given alone than each unit causes when several are given together. Allan determined the glucose equivalents of insulin on several depancreatised dogs and obtained a curve correlating units of insulin with glucose equivalents along which the actual results obtained on different animals lay very closely, and which is represented by the equation $\log. g = 1.86 - 0.85 \log. c.c.$ By the use of such a curve it would appear to be an easy matter to determine the unit value of a sample of insulin of unknown strength, but, after a thorough trial of the method for this purpose, it was decided not to recommend it for practical purposes for the following reasons:

(1) The considerable technical difficulties in depancreatising the animals, keeping them under constant metabolic conditions, and collecting the 24-hours urine over long periods

of time. This makes the method a more expensive and difficult one to carry out than that conducted on normal rabbits.

(2) Slight errors in the determination of the total sugar excretion in the 24 hours makes a considerable difference in the calculated unit value.

(3) Unaccountable variability in the results from day to day, even when the observation is technically flawless.

Thus, in two observations on the same animal, 12 units of insulin caused on one occasion 107 grams of glucose to be metabolised and on another 116 grams, thus giving in the former case a value of 10 units and in the second a value of 14. It is considered possible that these uncontrollable variations may depend on the influence of other ductless glands on carbohydrate metabolism. A full account of these investigations will be found in two papers by Frank N. Allan. Similar investigations have also been made by Penau and Simonnet and by Thiroloix.

Various modifications of the rabbit assay method have been tried from time to time, such as:

(1) Injecting very dilute solutions of insulin and watching the behaviour of the blood-sugar at short intervals for the first hour thereafter (Macleod and Orr).

(2) Very strict selection of rabbits, each one of which is then used once a week, being tested one week with a standard preparation and on alternate ones with insulins of unknown strength. This method was abandoned since, as has been pointed out elsewhere (Macleod and Orr, *loc. cit.*), the same rabbit did not give exactly corresponding results on different weeks when injected with the same amounts of the same standard insulin.

(3) Various test-tube reactions, such as the rate of glycolysis in blood withdrawn a short time following the injection of insulin, the methylene blue reaction according to the method worked out by Ahlgren for freshly excised muscle and also a similar method in which the reductase reaction of yeast is used.

Voegtlin and Dunn have investigated the possibility of basing the assay on the minimal lethal dose of insulin when administered to standardised white rats kept, after injection, at a temperature of about 30°C. Although interesting results have been obtained in these investigations, the method is not recommended for purposes of practical assay.

The Use of Standard Preparations.

Every laboratory engaged in the assay of insulin has from time to time employed some standard preparation of its own for the purpose of comparison. In Canada and the United States and in Great Britain, preparations manufactured either by the Connaught Antitoxin Laboratories of the University of Toronto or by the first licensee of this University, Eli Lilly & Co., of Indianapolis,

have been extensively used. The value of these checks is self
evident. A dry preparation of insulin hydrochloride has bee
furnished by the Medical Research Council and its strength ha
been determined by various laboratories to be such that one milli
gram equals eight units as provisionally defined by the Edinburg
Conference. This standard preparation will be kept as the metre
stick for insulin, with which the standards used by different labora
tories may be compared from time to time. By adopting thi
international standard, the practical definition of a unit of insuli
really becomes the potency which is equal to that of one-eighth of
milligram of the standard powder.

While this, more than anything else that can be done, will ensur
uniformity in the dosage of insulin, there are several facts i
connection with the use of the standard to which it may not be ou
of place to call attention.

(1) By whatever method of bio-assay the comparison betwee
the standard and the unknown is made, it will be necessary to us
considerable numbers of animals. Even when the same group c
animals is used for the test on the unknown as is used for th
standard, at an interval a few days removed—a method worke
out most systematically in the National Institute for Medica
Research—variability is to be expected on account of the unequa
response of the same animal on different occasions to equal dose
of insulin (*cf.* Macleod and Orr, Grevenstuk and Laqueur, etc.)
Some of this variability may be seasonal and affect a group c
animals as a whole, but it is also individual, some rabbits changing i
their susceptibility to insulin much more than others.

(2) Insulins prepared by different manufacturing processes d
not cause exactly the same types of lowering of the blood-suga
curve. Some, and apparently these are the less highly purifie
preparations, have a more prolonged action than others. They ac
more slowly, and although they may not bring the blood-sugar a
any point to so low a level as more quickly acting preparations, th
net effect in withdrawing sugar from the blood during a fixe
period of time may be the same.

By using a method of bio-assay in which the incidence of convul
sions or the lowest level of blood-sugar attained is used as the basi
of calculation, the results with a slowly acting preparation and
quickly acting standard might be entirely different, although the
were alike in their net effects on carbohydrate metabolism. Thi
possible source of inaccuracy is largely eliminated by using th
Toronto method as outlined above, but not entirely so.

(3) It is necessary for strict comparison that the standard an
the unknown be injected in closely corresponding dosage. Th
reason for this is apparent from the fact that small amounts c
insulin produce relatively greater effects than do large ones.

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4.

REPORT BY THE INSULIN COMMITTEE OF THE UNIVERSITY OF TORONTO

Here follows a report on the standardisation of insulin in t Insulin Committee Laboratory, University of Toronto, and on t physiological assay of a dry, stable sample of insulin hydrochlori prepared, under the direction of Dr. H. H. Dale, in the Natio Institute for Medical Research, Hampstead, London, England, an international insulin standard.

I. The Standardisation of Insulin in the Insulin Committ Laboratory

The method of insulin standardisation described below is reco mended by the Insulin Committee of the University of Toronto having given satisfactory results in their laboratory.

Animals.

Rabbits are used as test animals and are carefully selected so to ensure, first, that they be free from any visible sign of infecti and, secondly, that they run from about 1.8 kg. to about 2.2 in weight. (If, as happens occasionally, a sufficient number such weight cannot be obtained, lighter or heavier ones are p force used.) When, after a period of use, rabbits become heav than 2.2 kg., they are discarded.

In view of difficulty in obtaining a sufficient number of rabbi those used in the Insulin Committee Laboratory are not restrict to any particular sex, breed or colour.

Each rabbit is identified by tattooing a number upon the un surface of its ear, and an accurate record of its reaction towa insulin is kept. If any rabbit is noticed to be markedly irregul it is discarded.

The food consists of hay and oats, of which a surplus is at times present in the cages, except when the animals are bei starved prior to use. Water is also present at all times. All fo and water dishes, as well as the zinc trays in the bottom of t cages, are cleaned daily.

Rabbits are kept in adequate number to provide that they used once, and only once, per week during their period of usefulne the same rabbits being used upon the same day of each we Most rabbits are useful for from eight to ten weeks, by the e of which time they ordinarily become too heavy or their e are no longer suitable for bleeding.

Any rabbit which has had severe convulsions is carefully watched on its next time of use and, if its reaction varies widely from the normal, it is not used again for assay purposes.

Twenty-four hours before rabbits are to be used all food is removed from their cages. Water, however, is not withdrawn during this period of starvation.

Amounts of Insulin injected.

In assaying a sample of insulin of unknown potency, it is expedient to get, first of all, a rough approximation of its strength. In the Insulin Committee Laboratory, this is done by injecting a number of animals (say, eighteen) with a widely varying number of doses (say, six) and noting the lowest dose which produces convulsions in the majority of the animals injected with that dose. In the subsequent determinative assay, the largest dose given is somewhat below this so-called convulsant dose. (Convulsions in rabbits are not a reliable indication of the potency of insulin—unless very large numbers of animals be employed—but quite satisfactory use may be made of them in gaining a rough indication of the strength of an insulin sample.)

On the basis of its preliminary trial, the insulin sample under assay is diluted so that 1 c.c. of the diluted material contains what is estimated to be 2.5 clinical units. Dilution is made with distilled water to which sufficient hydrochloric acid has been added to bring it to pH 2.5 approximately. Thus any possibility of precipitation of the insulin by dilution is avoided. Of the diluted material, three different amounts, viz. 1.0 c.c., 0.8 c.c., and 0.6 c.c., per 2-kg. body-weight are injected subcutaneously, an equal number of rabbits being used for each dose.

Technique of Standardisation.

In the Insulin Committee Laboratory, eighteen has been found to be a convenient number of rabbits to use on any one day. Two samples of insulin are tested each day, using nine rabbits for each sample. In the morning, on the completion of twenty-four hours' starvation, the animals are brought into the laboratory, weighed, and placed in individual built-in cages.

For each rabbit, the amount of insulin to be injected is calculated, and then slightly more than 1 c.c. of blood is drawn by cutting across the marginal ear vein. The sugar content of this normal blood sample is determined, the Shaffer-Hartmann method being used as a matter of routine. Immediately a sample of its normal blood has been drawn, the animal is injected subcutaneously with its insulin and the time is noted. At intervals of 1½, 3 and 5 hours after injection, samples of blood are again withdrawn and their sugar content is determined.

It has been found to save much work, and to be quite as accurate, to pool 5 c.c. of the filtrate from each of the three blood samples taken after injection, rather than to determine the sugar content

of the three samples separately. As is illustrated hereinbelo the figure given by the pooled sample is the only one that ne be used in the calculation of results. This procedure has the d advantage that its use prevents one from seeing how the bloo sugar returns towards normal. This information, however, wh invaluable to an experienced experimenter, since it tells him great deal about the strength of the injected material, is not esse tial once a rough approximation of potency has been obtained.

Provided the diluted material contain about 2.5 clinical un per c.c., the blood-sugar in the majority of rabbits will have turned nearly to normal at the end of five hours after injection.

Calculation of Results and Discussion.

Having determined the sugar content of the normal blood a of the three blood samples taken after injection (or the avera of the latter as found from the pooled sample), results are calc lated from the equation:

$$\text{units (\textit{i.e.} clinical units) per c.c} = \frac{a}{b} \times \frac{w}{c} \times 1.5$$

where

a = percentage of blood-sugar before injection minus t average of the percentages of blood-sugar found in t samples taken $1\frac{1}{2}$, 3 and 5 hours following the injectio
b = percentage of blood-sugar before injection minus 0.0 per cent;
w = weight of the rabbit in kg.;
c = number of c.c. of the original (undiluted) insulin soluti injected.

This formula will be discussed below.

A *minimum* of three separate days of testing is spent in the ass of each sample, this practice being considered better advised th the completion of an assay in less time through the use of a larg number of rabbits each day. All the results on each of the thr amounts injected are finally averaged, a grand average of the three averages is taken, and the figure so obtained is called t assay.

When a test has been carried out as described above, should t results indicate that the insulin sample under assay is decided stronger or weaker than was supposed, a new dilution of t original sample is made upon the basis of the results obtaine for, in order that the method described may give accurate fi results, it is considered to be essential that all material inject should contain 2.5 clinical units per c. c. as nearly as is practicab Thus, if results indicate that a solution of insulin contained units per c.c. when it was thought to contain only 20 units per c. then the diluted material as injected actually contained slight more than 3 units per c.c. rather than 2.5 units per c.c. The so tion is therefore diluted in the ratio of 1 in 10 and re-assayed.

In the assay of a sample of insulin, it seems almost inevitable iat different workers, starting with different assumptions as to ie potency of the sample, will obtain different results. Of course, the several workers were to take care to re-assay until the sample i question was made to give the same results as those given by a nown standard under exactly the same conditions, the differences etween the several workers' results would tend to diminish and nally to vanish. As has been stated hereinabove, samples under ssay in the Insulin Committee Laboratory are diluted, before ijection, with a view to making 1 c.c. of the diluted material ontain 2.5 units — which "constant concentration" has been ound to be more satisfactory than a "constant volume" for in-ections. It would seem reasonable to suppose that, from solutions f equal concentration, equal amounts of active material would be bsorbed during a given period of time—other factors being con-tant. Thus, when three amounts of insulin, varying in volume ut the same in concentration, are injected, at first equal quanti-es would be absorbed in each case and the blood-sugar would fall about the same level in all the animals injected. (This is noted i actual practice.) Later, differences would be occasioned, due the fact that the smaller amounts would be completely absorbed efore the larger, and such differences would be apparent in the lood samples taken three hours and five hours after injection. Vere the concentration of the amounts injected to vary, their olume being kept constant, it would seem that, other factors eing constant, absorption would not be equal and hence effect ould not be equal in each case. It would be extremely difficult prove that different injection-concentrations of insulin produce ifferent effects—especially when using an animal so variable, i its response to insulin, as the rabbit—but in the Insulin Com-iittee Laboratory the practice of employing a constant injection-oncentration has proved to be most conducive to the obtaining f consistent results.

As regards the calculation of results, it is fully recognised that the ctual relation between the amount of insulin injected and the resul-ant fall in blood-sugar is not taken into account on the equation:

$$\text{units per c.c.} = \frac{a}{b} \times \frac{w}{c} \times 1.5$$

The latter is premised upon this relation being a direct one, hereas it is known that small doses of insulin produce relatively reater effects than do large doses. Based upon results obtained in he Insulin Committee Laboratory, a curve has been obtained howing the relation between amount injected and effect; and it ould appear that this relation may be represented by a curve f much the same form as that obtained by F. N. Allan [1] to represent he glucose equivalent of insulin in completely depancreatised dogs. Iowever, owing to the very considerable variation in the sensitivity f rabbits, the probable error of each point of the graph is so

[1] ALLAN, Frank N.: *American Journal of Physiology*, 1924, lxvii, 275; 1925, xxi, 472.

great that the curve may be taken to indicate only the gen trend of the relation between dose and effect. To get this rela represented by a curve sufficiently accurate to justify its use w require a *very* great number of results on a *very* large numbe rabbits.

Admittedly, calculation of results using the formula $\frac{a}{b} \times \frac{w}{c} \times$ is quite arbitrary—though to judge from the form of the cu already obtained, the relation between dose and effect w appear to approximate a straight-line function for doses of ins that lie between 1.5 and 2.5 units per 2 kg. In any case, the use is made of the formula has given satisfactory results, to date, in Insulin Committee Laboratory. Truly enough, on any one am of insulin injected, the results obtained vary fairly widely, and recently only those results which agreed within 25 per cent betw extremes were averaged, provided also that the majority of said results fell within these limits. Experience has now sh however, that if a sufficient number of animals are used, high low results balance each other.

On the doses which are used as described above, it is usu find that 20 to 25 per cent of the animals develop convulsi Although, as already stated, convulsions are not considered reliable indication of the potency of insulin, one should look suspicion upon a solution which occasions convulsions in consi ably more or less than 20 to 25 per cent of the animals injec (In this connection, attention should be called to the fact convulsions may be antidoted quickly by an injection of gluc This is best left undone, however, except in preliminary where considerable overdoses of insulin may have been gi Most rabbits which develop convulsions on 2.5 units or less recover of their own accord.)

While, as already stated, calculation of results by the form $\frac{a}{b} \times \frac{w}{c} \times 1.5$ has given quite satisfactory results, it would und tedly be better advised to use always a standard of reference in assay of each sample of insulin, running an equal number of rab upon the standard and upon the sample under assay. Here ag however, it should be pointed out that the standard and unknown must have about the same hypoglycæmic effect be they can be accurately compared.

II. The International Insulin Standard.

In July 1924, a preliminary sample of the proposed internati insulin standard was received from Dr. Dale in two forms— consisting of tablets made up to contain 1 mg. of the prop standard with pure sodium chloride as basis, the other consis of tablets made up to contain 1 mg. of the standard with saccharose as basis. Dr. Dale reported that, when first prepa these tablets had proven to give a clear and perfectly satisfac solution with N/100 HCl. However, owing probably to s

bsequent reaction between the insulin hydrochloride and the uent of the tablets, the latter, after their arrival in Toronto, were ind to be insoluble both in distilled water and in water to which a iall amount of hydrochloric acid had been added. Though a clear ution could be obtained with reactions on the alkaline side of I 7, it was felt that this was not particularly helpful, since insulin unstable if kept for any length of time in an alkaline solution.

Some attempt was made to ascertain the potency of the tablets, t the results were very irregular—owing probably to the impractic-ility of obtaining a homogeneous solution. Such results as were tained indicated that each tablet contained about 4 units of insulin.

Under all the circumstances, Dr. Dale agreed that a mixture insulin hydrochloride with such diluents as sodium chloride saccharose would not be satisfactory for use as an international andard of reference.

In November 1924, a sample of pure dry insulin hydrochloride wder was received in the Insulin Committee Laboratory. In aking an assay of this powder, it seemed better to make up solu-ns of small volume fairly frequently rather than to make up one lk solution, for the latter would have required sterilising (as Berkefeld Filter) with possible loss of potency. Accordingly, t more than sufficient solution for two days of testing was made any one time. Solutions were prepared with distilled water in cases and gave a reaction of about pH 4. At this reaction sulin is completely soluble and there is no danger of iso-electric ecipitation. When not in use, all solutions were kept in a frigerator at 6°C.

It was understood, and was assumed merely as a starting-point, at the dry insulin hydrochloride powder was of a potency some-hat greater than the insulin hydrochloride used in the tablets eviously supplied. Since the latter had been found to contain the neighbourhood of 4 units per mg., a solution containing 4 mg. the powder in 1 c.c. of distilled water was made up and considered a 20-unit per c.c. solution for purposes of assay. In accordance th the procedure of assay described hereinabove, this solution is then diluted in the ratio of 1 in 8 before injection. It was und that very severe convulsions were developed by all the rabbits at were injected with the larger amounts. Those on the smaller nounts gave figures which indicated a potency of between 6 and 7 its per mg.

In subsequent work at this time, therefore, solutions were made to contain 3 mg. of the international standard in 1 c.c. of distilled ater, and such solutions were treated as containing 20 units per :. On this basis tests were carried out on some fifty-two rabbits. ie results obtained on different days varied from 5.8 to 7.5 units r mg. and averaged 6.5 units per mg. Only 15 per cent of the imals developed convulsions.

It has been pointed out above that ordinarily, in the method of say used in the Insulin Committee Laboratory, 20 to 25 per cent the injected animals develop convulsions when the potency the sample under assay is as assumed. Since in this particular

case only 15 per cent of the animals developed convulsions, was assumed that the solution of insulin hydrochloride was too strong, although it was also observed that the blood-sugar the animals injected with this solution did not return as close the normal level at the end of five hours after injection as usually the case with ordinary solutions of insulin. This fail of the blood-sugar to return towards normal was considered perhaps peculiar to insulin hydrochloride and, as became appar later, too much significance was placed upon the small percent of convulsions.

When a report of these results was sent to Dr. Dale, it was lea that in England the international standard had been estima to contain about 8 units per mg. Several possible explanati of the discrepancy between the latter and the above-mentio results suggested themselves, and a great deal of work was necess to clear up some of the points involved — though most of this w is not of particular importance in this report. Among other thin however, it was decided to re-assay the international standa assuming that 1 mg. thereof contained 7 units. On this basis, average of the results obtained was a figure of 8.1 units per Also, 33 per cent of the animals used developed convulsions, w on the largest dose 60 per cent had convulsions. Here, too, th was a distinct tendency for the blood-sugar to be unusually five hours after injection.

In the light of these results, it appeared that when the fig of 6.5 units per mg. had been obtained, there had been used a of rabbits which were particularly insensitive to convulsio The obvious thing to do, therefore, was to re-test the internatio standard, assuming that it contained 8 units per mg.

On this basis, solutions were made up to contain 2.5 mg. of insulin hydrochloride powder in 1 c.c. of water, and such soluti were treated as 20-unit per c.c. material. The results obtained given below.

Table I shows a sample of eight days' results, tabulated as th are recorded.

Table I. — 2.5 mg. International Insulin Standard in 1 c.c. ta as a 20-unit per c.c. Solution.

Weight of rabbit, i.e. "w" kg.	Dose per 2 kg. c.c.	Dose given, i.e. "c" of formula c.c.	Volume of diluted material injected c.c.	Normal blood-sugar %	Average of 1½, 3 & 5 hr. blood-sugars %	"a"	"b"	Convulsions	a/b × u
1.52	0.100	0.076	0.608	0.126	0.068	0.058	0.081	—	2
2.32	0.100	0.116	0.928	0.131	0.081	0.050	0.086	—	1
1.64	0.075	0.061	0.488	0.120	0.054	0.066	0.075	—	3
1.86	0.125	0.116	0.928	0.126	0.071	0.055	0.081	—	1
2.20	0.075	0 082	0.656	0.113	0.071	0.042	0.068	—	2
1.88	0.125	0.118	0.944	0.109	0.059	0.050	0.064	—	1
1.94	0.125	0.121	0.968	0.122	0.072	0.050	0.077	—	1
1.80	0.075	0.068	0.544	0.122	0.081	0.041	0.077	+	2
1.87	0.125	0.117	0.936	0.146	0.062	0.084	0.101	+	2
1.98	0.125	0.124	0.992	0.124	0.059	0.065	0.079	+	1
1.63	0.075	0.061	0.488	0.122	0.060	0.062	0.077	—	3
1.97	0.125	0.123	0 984	0.120	0.085	0.035	0.075	—	1

Table I (continued).

/eight of abbit, e. "w"	Dose per 2 kg.	Dose given, i.e. "c" of formula	Volume of diluted material injected	Normal blood-sugar	Average of $1^1/_2$, 3 & 5 hr. blood-sugars	"a"	"b"	Convulsions	$\frac{a}{b} \times \frac{w}{c} \times 1.5$ units
rg.	c.c.	c.c.	c.c.	%	%				
.54	0.100	0.077	0.616	0.132	0.085	0.047	0.087	—	16.1
.79	0.075	0.067	0.536	0.119	gave sugar		0.074	+	—
.49	0.100	0.074	0.592	0.123	0.068	0.055	0.078	—	21.2
.10	0.075	0.079	0.632	0.123	0.066	0.057	0.078	—	29.0
.16	0.100	0.108	0.864	0.118	0.084	0.034	0.073	—	14.0
.04	0.100	0.102	0.816	0.109	0.065	0.044	0.064	—	20.6
.77	0.075	0.066	0.528	0.122	0.068	0.054	0.077	—	28.1
.27	0.100	0.113	0.904	0.117	0.072	0.045	0.072	—	18.9
.83	0.125	0.115	0.920	0.114	0.052	0.062	0.069	+	21.6
.00	0.125	0.125	1.000	0.119	0.076	0.043	0.074	—	13.9
.57	0.100	0.078	0.624	0.138	0.065	0.073	0.093	+	23.6
.94	0.125	0.123	0.984	0.124	0.072	0.052	0.079	—	15.7
.77	0.075	0.066	0.528	0.124	0.081	0.043	0.079	—	21.8
.62	0.075	0.061	0.488	0.124	0.087	0.037	0.079	—	18.6
.00	0.125	0.125	1.000	0.118	gave sugar			+	—
.60	0.100	0.080	0.640	0.129	0.083	0.046	0.084	—	16.3
.46	0.100	0.073	0.584	0.123	died		—	+	—
.71	0.075	0.064	0.512	0.138	0.089	0.049	0.093	—	21.0
.83	0.075	0.069	0.552	0.131	0.087	0.044	0.086	—	20.5
.13	0.100	0.106	0.848	0.123	0.074	0.049	0.078	—	18.8
.76	0.075	0.066	0.528	0.124	0.052	0.072	0.079	+	36.5
.93	0.125	0.121	0.968	0.124	0.065	0.059	0.079	—	17.8
.83	0.125	0.115	0.920	0.124	0.060	0.064	0.079	—	19.3
.67	0.125	0.104	0.832	0.127	0.065	0.062	0.082	+	18.1
.73	0.125	0.108	0.864	0.119	0.072	0.047	0.074	—	15.3
.24	0.100	0.112	0.896	0.124	0.071	0.053	0.079	+	20.0
.03	0.075	0.076	0.608	0.123	0.063	0.060	0.078	+	30.5
.59	0.075	0.060	0.480	0.115	0.063	0.052	0.070	—	29.5
.22	0.075	0 083	0.664	0.129	0.089	0.040	0.084	—	19 0
.38	0.100	0.069	0.552	0.133	0.089	0.044	0.088	—	15.1
.69	0.125	0.106	0.848	0.113	0.067	0.046	0.068	—	16.2
.41	0.100	0.070	0.560	0.152	died		—	+	—
.31	0.075	0.087	0.696	0.138	0.081	0.057	0.093	—	24.7
.66	0.075	0.062	0.496	0.124	0.052	0.072	0.079	+	36.4
.27	0.100	0.113	0.904	0.103	0.063	0.040	0.058	—	20.7
.90	0.125	0.119	0.952	0.129	0.076	0.053	0.084	—	15.1
.20	0.100	0.110	0.880	0.115	0.074	0.041	0.070	—	17.7
91	0.125	0.120	0.960	0.111	0.063	0.048	0.066	—	17.4
.98	0.125	0.124	0.992	0.120	0.066	0.054	0.075	—	17.3
.84	0.075	0.069	0.552	0.128	0.067	0.061	0.083	+	29.2
.76	0.125	0.110	0.880	0.132	0.087	0.045	0.087	—	12.4
.81	0.125	0.113	0.904	0.122	0.061	0.061	0.077	—	19.0
.31	0.100	0.115	0.920	0.118	0.077	0.041	0.073	—	16.9
.43	0.100	0.071	0.568	0.127	0.066	0.061	0.082	—	22.2
.10	0.100	0.105	0.840	0.127	0.081	0.046	0.082	+	16.9
.69	0.075	0.063	0.504	0.136	0.083	0.053	0.091	—	23.3
.03	0.075	0.076	0.608	0.118	0.076	0.042	0.073	—	23.0
.80	0.125	0.113	0.904	0.124	0.060	0.064	0.079	—	19.4
.62	0.075	0.061	0.488	0.128	0.083	0.045	0.083	—	21.7
.00	0.125	0.125	1.000	0.119	0.037	0.082	0.074	+	26.4
.71	0.075	0.064	0.512	0.115	0.074	0.041	0.070	—	23.5
.83	0.100	0.091	0.728	0.102	0.063	0.039	0.057	—	20.3
.79	0.100	0.089	0.712	0.133	0.085	0.048	0.088	—	16.2
.96	0.100	0.098	0.792	0.122	0.074	0.048	0.077	—	19.0
.24	0.100	0.112	0.896	0.115	0.061	0.054	0.070	—	23.2
.81	0.100	0.090	0.720	0.122	0.059	0.063	0.077	+	24.2
.05	0.100	0.102	0.816	0.119	0.072	0.047	0.074	—	19.0
.91	0.100	0.095	0.760	0.115	0.056	0.059	0.070	—	25.1

Notes to Table I.

(*a*) No attempt was made, of course, to make injections as accurately as they appear in the fourth column of the table —*e.g.* for the first rabbit the dose, as calculated, was 0.608 c.c., but the dose actually injected was 0.61c.c.
(*b*) In the two cases in which sugar was given, the respiration of the animals had fallen so low that they could not be bled.
(*c*) Averaging the figures on the three separate doses gives the following:

Dose . . .	0.125 c.c.	0.100 c.c.	0.075 c.c.
Units . .	17.4	19.3	26.1

The average of the three lower figures is 20.9, *i.e.* 1 c.c. of solution contained 20.9 units, and since there were 2.5 mg. of the international standard in 1 c.c of solution

1 mg. = 8.4 units

(*d*) Of the 70 animals injected, 18 developed convulsions, *i.e.* about 26 per cent.
(*e*) More than the ordinary number of rabbits were injected with a 0.100 c.c. dose on the last day to equalise the results.

In addition to the results covered in Table I, others were obtained with a solution made up to contain 2.5 mg. of the international standard in 1 c.c. of water. The daily averages of these results are shown in Table II.

Table II. — 2.5 *mg. International Insulin Standard in* 1 *c.c. taken as a* 20-*unit per c.c. Solution.*

	Number of rabbits used	Units per c.c.	Number of convulsions
	9	17.6	1
	9	19.3	1
	9	21.1	1
	9	17.4	2
	16	22.1	5
	12	20.5	3
	13	21.7	6
	8	24.8	1
	8	24.2	1
	8	15.8	1
	9	19.6	1
	17	18.3	2
Totals	127	242.4	25

The average number of units per c.c. for these 12 days is 20.2, giving a result of 8.1 units per mg. of the international standard. As may be observed from the last column, 25 of the 127 animals used developed convulsions, *i.e.* about 20 per cent.

Considerable deviation in results is shown in Tables I and II. It was largely on that account that one strength of solution was used on as many as 200 rabbits. It was felt, however, that, since an absolute value had to be set upon the international insulin standard, the only safe plan was to use a large number of animals.

It can now be said with reasonable assurance that 1 mg. of the international standard contains approximately 8.5 of the units which have been used in the Insulin Committee Laboratory for the past two years. However, in order to avoid the use of fractions of a unit, it was suggested that 1 mg. of the international insulin standard might be defined as containing 8 units per mg. This involved a change which was insignificant from the clinician's point of view—a change that could not be recognised by any known method of standardisation without the expenditure of a great deal more time and effort than is likely to be devoted to any ordinary sample of insulin.

Insulin Committee, University of Toronto:
(Signed) Albert E. GOODERHAM,
Chairman.

F. Lorne HUTCHISON,
Executive Secretary.

5.

REPORT ON THE INTERNATIONAL INSULI STANDARD

By E.R.Squibb & Sons' Research and Biological Laboratorie
(John F. Anderson, *Director*).

Method of Assay.

Our assay of this sample was made by the standard rabb method of the Insulin Committee, University of Toronto, bu with certain modifications, viz.:

1. All of our rabbits were injected with the same per-kilo dos of insulin instead of the three different doses used in the Insuli Committee Laboratory. The concentration of the injected solutio was 2.5 clinical units per c.c., and all rabbits on a given samp were injected with a dose equal to 0.8 c.c. of the diluted solutio per 2 kilos of body-weight.

2. The glucose content of the blood samples was determine by the method of Hagedorn and Jensen as described in *Biochemiscl Zeitschrift*, 135-6, 46-58 (1923), with certain minor modification adopting the method to the use of an amount of blood comparab to that used in the Shaffer-Hartmann method.

3. A control sample of insulin as a standard of reference wa assayed at the same time and in exactly the same manner as th international standard.

Results.

Preliminary assays on the international insulin standard we carried out on white albino rats, thus enabling us to inject equ valent doses of this standard and of our so-called "standard insulin. Following the assay of the sample by the rabbit metho we again made an assay using rats, which confirmed the relativ values of the international standard and our standard, previousl found by the rabbit method. We merely state here that we mad these additional tests involving the use of rats without, howeve elaborating on the details thereof, inasmuch as our reported valu of the sample was based on the rabbit assay.

As a standard of reference in the assay, we used one of ou own lots of insulin which we had previously used for a period several months as a standard in assaying other preparations insulin. We know quite accurately the activity of this "standard as compared to various lots of another brand of insulin, one lo

of insulin from the Connaught Laboratories and several of our own lots assayed in the Insulin Committee Laboratory at the University of Toronto, as we have made a large number of assays to establish these relative values.

Our rabbit assay of the international standard and our above-mentioned "standard" gave us the following absolute (so-called) potencies:

Our standard (Squibb insulin) 20.3 clinical units per c.c.
International insulin standard 10.7 clinical units per mg. of powder.

From a study of accumulated data on the relative activity of our standard to the various other insulin preparations mentioned above, we have assigned to our "standard" a value of 16 clinical units per c.c. From this assigned value of our "standard", the activity of the international standard is found by simple calculation to be:

$$\frac{16}{20.3} \times 10.7 = 8.4 \text{ clinical units per mg.}$$

We regret that we were unable to do more work upon the assay of the international insulin standard, but this was not possible owing to the limited amount of material furnished and the comparatively short time allowed for the assay.

E. R. Squibb & Sons:

(*Signed*) John F. Anderson,
Director.

6.

INSULIN STANDARDISATION IN THE LILL
RESEARCH LABORATORIES

By G. H. A. Clowes, *Director.*

The assay of insulin has been carried on in the Lilly Resear Laboratories for a period of over three years. The method no being employed is practically the same as that used in the Insul Committee Laboratory at the University of Toronto. On accou of the great variation exhibited by individual animals, it has be found advisable to carry out long series of experiments on each ne lot of insulin prepared, basing the final report regarding the unita on statistical results in which the new lot to be tested is compar with a standard which will be referred to subsequently. Upwar of 1,000 to 1,500 rabbits are employed for each individual assay.

In the interest of physician and patient alike, it is extreme important that consecutive lots of insulin supplied should have nearly as possible the same unitage or therapeutic effect. T standard with which each new lot of insulin Lilly is compar was prepared by mixing equal amounts of ten previous lots insulin which had been carefully assayed in the Lilly Laboratori checked by a group of testing clinicians and subsequently approv by the Insulin Committee of the University of Toronto as contai ing 20 units per c.c.

This composite sample has been subjected to severe durabili tests at high temperatures and, from our daily assays for a period eight or ten months, there can be no doubt that it is perfectly stab

While the method of assay adopted is extremely accurate wh a sufficient number of animals are employed and the solutions be compared are of approximately the same strength, it has be found that the comparison of solutions having any consideral variation in unitage will lead to quite erroneous conclusions unl further experiments are carried out in which the previously varyi solutions are brought to approximately the same concentration a further tests carried out.

It is evident, therefore, that, in the assay of a new sample, t approximate strength of which is not even known, a large amou of preliminary work must be done to bring the preparation with 10 to 15 per cent of the standard before final assays can be carri out to determine its exact strength.

This accounts for the large numbers of animals that are us by the Lilly Research Laboratories in the assay of each lot compared with the numbers used in the Insulin Committee Labo tory at Toronto, since there the prime purpose of the assay is determine whether the preparation submitted has a correct unita

The dry powder prepared under the direction of Dr. Dale at the National Institute for Medical Research, Hampstead, London, for use as an international standard of reference was submitted to assay in the Lilly Research Laboratories in exactly the same manner as would have been the case with a new commercial lot of insulin received from the factory.

The information had been received that the specimen in question probably contained between 5 and 10 units of insulin per milligram. Preliminary work carried out in the Lilly Research Laboratories indicated that the potency was between 7 and 10 units per milligram.

The subsequent procedure adopted in the assay of the international insulin standard was as follows:

A solution was prepared containing 3 milligrams per c.c., which should therefore contain 21 units per c.c. if the dry preparation contained 7 units per milligram. This solution was handled in identically the same manner as the standard of reference referred to above, each c.c. being diluted to 8 c.c. prior to injection into the test animals.

Six animals were run each day on each preparation for a period of two weeks;

Two animals on each preparation received 0.6 c.c. of the diluted materials per two kilograms;

Two animals on each preparation received 0.8 c.c. of the diluted materials per two kilograms; and

Two animals on each preparation received 1 c.c. of the diluted materials per two kilograms.

The average of the indicated unitage of the six animals on each preparation for each day was determined and the number of convulsions noted.

The results for period 1, covering the first two weeks, are tabulated below:

Table I. — First Detailed Period.

Lilly Standard 20-unit material			*International Standard of Reference. 3 mg. per c.c.*		
Average indicated units	Number of rabbits used	Number of convulsions	Average indicated units	Number of rabbits used	Number of convulsions
20.6	6	2	23.5	6	1
21.2	6	1	27.1	6	3
20.0	6	1	26.5	6	3
18.4	6	0	24.4	6	2
25.9	6	1	24.6	6	2
18.5	6	1	26.1	6	3
14.5	6	0	19.0	6	3
18.0	6	1	26.2	6	1
23.3	6	1	26.2	6	4
25.7	6	2	30.0	6	5
206.1	60	10	253.6	60	27
Av. 20.6	$16^2/_3$ % convulsions		Av. 25.4	45 % convulsions	

From the above results, it was evident that the internatio standard contained somewhat more than 7 units per milligra Since the average of the Lilly standard was 20.6 and of the int national standard at this dilution 25.4, the value of the latter wo appear to be approximately 24.6. This figure divided by 3 wo indicate that the international standard contained approximat 8.2 units per milligram.

In the next series of experiments a dilution was employed co taining 2½ milligrams per c.c., which should therefore confo approximately with the Lilly standard if the international sta dard contained 8 units per milligram.

This preparation was diluted in the ratio of 1 in 8, together wi the Lilly standard, and the two preparations were then compar daily on six rabbits each for a period of two weeks.

The results of this experiment are reported under Table II.

Table II. — Second Detailed Period.

Lilly Standard 20-*unit material.*			*International Standard of Reference.* 2.5 *mg. per c.*		
Average indicated units	Number of rabbits used	Number of convul-sions	Average indicated units	Number of rabbits used	Number convul-sions
19.4	6	1	20.6	5	0
23.9	6	2	21.5	6	0
24.1	6	3	22.9	6	1
22.0	6	1	32.0	6	5
18.6	6	3	22.8	6	1
20.9	6	2	25.3	6	3
17.8	6	1	21.2	6	2
22.7	6	1	27.8	6	4
18.5	6	1	18.8	6	2
17.9	6	1	19.7	6	2
205.8	60	16	232.6	59	20
Av. 20.6	26.6% convulsions		Av. 23.3	34% convulsio	

It will be seen that the average of the Lilly standard is st 20.6, that of the international standard 23.3, from which it wou be concluded that the unitage of this dilution of the internatior standard was approximately 22.5, thus giving the latter a val of approximately 9 units per milligram.

The average of these two periods would thus be 8.6 units p milligram, but from experience with tests of this type it has be considered inadvisable to base any final conclusions on any grou of experiments in which very wide variations in indicated unita have been noted from day to day.

From previous experience with this method of assay, and taki into consideration the incidence of convulsions, etc., it appear probable that one or two of the high figures obtained with t international standard in period 2 might be incorrect, thus indicati

a reasonable probability that the correct value of the international standard would be somewhat under rather than over the average figure of 8.6 referred to above.

Four additional series of fortnightly periods were run in which the Lilly standard was compared with the international insulin standard, made up on the basis of 2½ milligrams to the c.c. on the assumption that the international standard contained between 8 and 8.5 units per milligram. For conservation of space, it has not been considered necessary to report these results in detail, the final calculation of the unitage of the international standard per milligram being based on the grand average of all the results obtained during each individual period. The results for the entire six periods, covering assays carried out on over 700 rabbits, are reported under Table III, and show an average for the entire series of approximately 8.5 units per milligram.

Table III.

			Units per milligram in international insulin standard
First	fourteen-day	period	8.2
Second	»	»	9.0
Third	»	»	8.7
Fourth	»	»	8.2
Fifth	»	»	8.4
Sixth	»	»	8.7

Average of above six periods, 8.5

An attempt has been made in the Lilly Research Laboratories to determine the limits of possible experimental error when two preparations of insulin of approximately the same strength are carefully compared with one another over a prolonged period of time, following the procedure adopted in comparing the international standard with the Lilly composite standard. It appears probable that the maximum possible experimental error is 5 per cent plus or minus. On this assumption it may be concluded that the international insulin standard contains not less than 8.1 or more than 8.9 units of insulin per milligram and that the actual figure is probably very close to the mean of these figures, or 8.5 units per milligram.

(Signed) Geo. B. Walden,
Controller of Insulin Assay.

G. H. A. Clowes,
Director of Research, Lilly Laboratories.

August 12th, 1925.

7.

THE ASSAY OF INSULIN BY THE CONVUI SIVE-DOSE METHOD ON WHITE MICE

By A. M. Hemmingsen and A. Krogh

(From the Nordisk Insulin Laboratorium and the Laboratory of Zoophysiology of Copenhagen University).

The starting-point for the development of the method of insul assay here described was the observation, made in December 192 that mice kept at room temperature were able to withstand enc mous doses of insulin, but were promptly killed by small dos when kept in an incubator at temperatures ranging from 25° 35°C. At ordinary temperatures the mice would become strong affected, their temperatures and, consequently, their metabo activity would decrease and this would protect them against t lethal effects of the hypoglycæmia, which would be shown to very pronounced. At a high and uniform temperature, on the oth hand, characteristic symptoms would develop, ending usually typical hypoglycæmic convulsions, but in a few per cent of t cases in a state of profound coma and death without convulsior The symptoms could at any stage be relieved by injection of glucos

The method of assay based on these observations was at fi conceived as an absolute method, and as the mouse dose of insul was chosen the quantity which would produce convulsions collapse in half the number of mice injected. The relation betwe the mouse dose and the rabbit unit, as originally defined by t Toronto investigators, was determined by a small number of co parisons (much too small according to later experience) as 1 : 6(

The experimental technique was as follows: Young mi weighing from 16 to 20 g. were used. They were fed regularly white bread and water. For the tests each mouse was subcut neously injected with ¼ c.c. of a suitably diluted solution of t insulin or tissue extract to be determined, and placed in a cylind cal glass jar (battery jar 16 cm. high and 10 cm. in diameter) the shelves of a large incubator with glazed doors, so as to all regular inspection. The air in the incubator was mixed by electric fan so as to maintain the same temperature (within abo 1°) throughout. Different temperatures from 27° to 32° C. were trie and 30° selected as being high enough to allow the symptoms develop, while not of itself visibly affecting the mice. A certa

number of mice varying from three to ten, according to the importance of the assay, were used for each test, and the symptoms developing were observed and noted at the time of their incidence. We distinguished between the following stages:

Mice which are affected (A) generally become very quiet, sitting still most of the time with curved back and drooping head. The legs, and especially the hind legs, become slightly paralysed, they slide out from the body on the smooth bottom of the glass jar, and often remain for considerable periods in unnatural positions At this stage the eyes are usually widely open and some exophthalmus is a frequent symptom. This is usually even more pronounced in the second stage (AA), when the mouse is sprawling on the belly with almost completely paralysed hind legs, and often with the tail elevated to a more or less vertical position. This stage may, usually after some remissions, pass directly into a stage of collapse (Cl) in which the mouse lies motionless on the belly or on the side, and is unable to raise itself when put on its back, but more often the collapse is broken at intervals, or on any provocation (*e.g.* attempts to move) by violent convulsions (Cn). When a mouse is collapsed or convulsions appear, the test is brought to a close, and the mouse given an injection of ½ c.c. 10-per-cent glucose. By this treatment very few mice are lost, and the same animals could be used for three days in the week over a period of two months. When they became too old, or got outside the weight limits, they were discarded. A statistical treatment of a large amount of material has shown that, within the limits of 16 to 20 g., we do not commit any appreciable error by injecting the same dose per mouse without regard to the individual weight. When the total number of mice is distributed into weight classes of 15, 16, 17, 18, 19 and 20 grams, the classes from 16 to 20 (inclusive) show the same sensitivity, while that of the class 15 is *perhaps* slightly higher.

In the assay by this method a personal element entered, in so far as the less severe stages of affection (A) and (AA) were taken into account. By definition the mouse dose would cause convulsions or collapse (Cl or Cn) in half the number of mice injected, but a test on five mice, in which three mice had convulsions while two remained unaffected, would be considered less convincing than another in which two only reached the stage of (Cn or Cl), while the rest were (AA) or even two (AA) and one (A).

This simple method was satisfactory during the first stages of our insulin work, when large numbers of tests were made to determine the optimum conditions for the extraction and purification of the pancreas material. Control experiments, the number of which was, however, too small, appeared to show that determinations on ten mice could give results accurate within about 20 per cent. Later on, however, serious difficulties made themselves felt. Comparative tests with different strengths of the same solution would sometimes give contradictory results showing dilutions down to one-half to be stronger than the original. This discrepancy was especially marked when the tests were made at intervals, and

it turned out that the whole stock of mice employed might, witho any apparent reason, show sudden and large fluctuations in sen tivity. These could be guarded against by the introduction, July 1923, of a standard powder, solutions of which were us for comparison in all subsequent tests.

Another serious complication was brought about by chang in the dispersion of the sensitivity, which underwent a considera increase. A statistical study of the tests made during the fir nine months of 1923 shows that we had then, except for two sho periods, a comparatively uniform stock of sensitive mice, allowi fairly accurate determinations being made on a small number mice. Later on we found large differences in the individual sen tivity, necessitating the use of large numbers of mice for the test Much time has been spent in investigating the cause of this chang but with slight success. Various systems of feeding have be tried. We have found it of no use to feed the mice on diets contai ing much fat and little carbohydrate. The sensitivity becom somewhat lowered, but not more constant or uniform. We no add millet-seed to the standard diet. This addition has no appare influence upon the sensitivity, but improves the general health the mice, which can be used for experiments during a longer perio

We have tried the introduction of periods of starvation vari between 2 and 24 hours. The sensitivity increases with the leng of the starvation period, but the dispersion is increased rath than diminished. When the mice are fed after a period of starvati just prior to the experiment, the sensitivity is greatly diminishe but even then very variable. In the warm summer of 1925 t sensitivity was diminished, but the mice showed greater dispersi than in the spring.

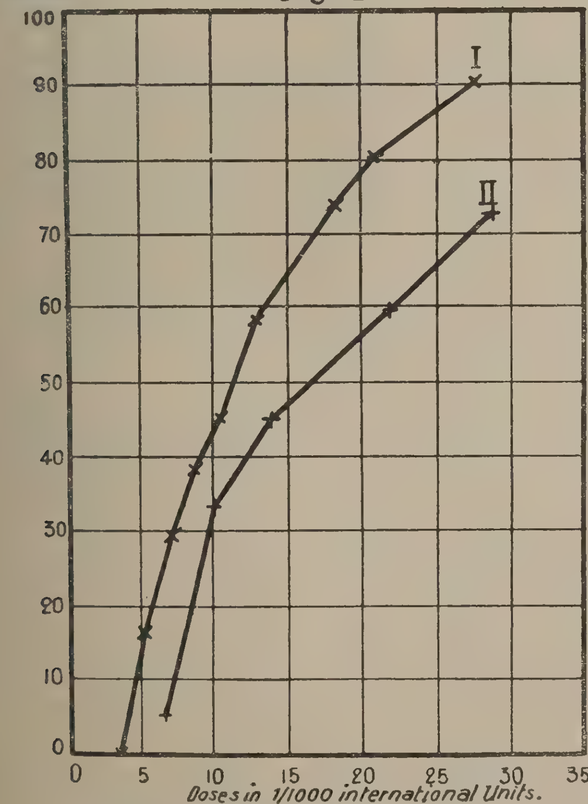
A large number of the mice are always suffering from more less severe colds, which affect the sensitivity and make it apparent very variable. We have tried in vain to get rid of this very cont gious disease, the probable absence of which in the first period our experiments may perhaps have had something to do wi the greater uniformity of the results.

We now find it necessary to use large numbers of mice, and arrange the tests on a strictly comparative basis, in order to obta the accuracy of $\pm$ 5 per cent deemed necessary.

The general technique is as described above, but the prelimina symptoms (A) and (AA) have been discarded as a basis of compar son, partly because they cannot conveniently be expressed figures, partly because of the difficulties connected with the observation and delimitation. The assay is now carried out a series of tests, in each of which from 60 to 80 mice are use One-half of the number are injected with a dose of the standa powder, while the other half receives a dose supposed to be of t same strength of the substance under assay. These tests are r peated from 8 to 12 times in 4 to 6 consecutive days, with varyi concentrations of the standard and of the unknown sample. T number of mice showing the symptoms of collapse or convulsio in each test are noted, and the final results are obtained as follow

The percentage numbers of mice (Cl) or (Cn), at each concentration employed, are worked out, and plotted as in Fig. I, with the doses of insulin as abscissæ and the percentage of "falls" as ordinates. More or less smooth curves can be drawn through the points determined. If, now, the assumption regarding the strength of the preparation under test had been correct, the two curves should be identical. In the example here given, we have on purpose taken

Fig. I



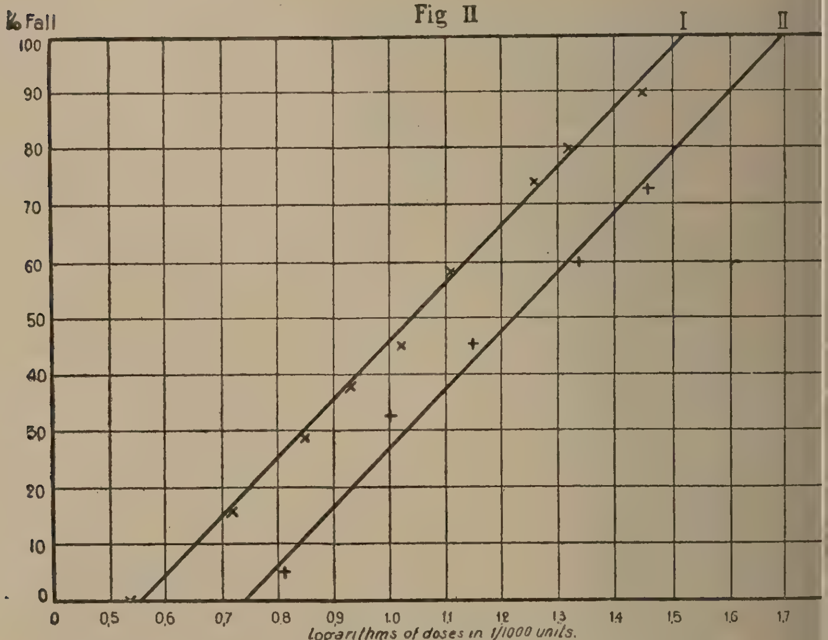
I Curve of Standard Preparation.
II Preparation X assumed to be 20 units per mg.

a case in which the assumption is very far from being correct, and here we must expect a constant proportion between the doses assumed for the unknown preparation and those giving the identical percentage number of falls in the standard curve. For the five determinations composing the curve of the unknown we have assumed the doses in 1/1000 units 29.0, 21.5, 14.0, 10.0, 6.5. The standard doses giving the same number of falls are, from the curve, 18.0, 13.5, 10.5, 7.8, 4.2. According to the determinations, the preparation contains, therefore, instead of the 20 units per mg.

$20 \times \frac{18}{29} = 12.4$, $20 \times \frac{13.5}{21.5} = 12.5$, etc., or 12.4, 12.5, 15.0, 15. 12.9, with an average of 13.7. The dispersion is $\pm$ 1.5, and tl mean error of the average $\pm$ 0.7, or just 5 per cent.

More accurate results can be obtained, however, when the curv are smoothed. This can be done in several different ways, b as a rule we utilise the fact that the ideal curve relating the insul doses to the percentage number of falls produced in a unifor stock of mice is logarithmic in character. This means that tl relation between the logarithms of the doses and the percenta

Fig II



I Curve of Standard Preparation II Preparation X assumed to be 20units per

falls is a straight line, and for two preparations like those he under discussion we should obtain two *parallel* straight line parallel because a constant proportion between the doses givi the same percentage number of falls must be represented by constant logarithmic difference. The logarithms of the doses a plotted as abscissæ in Fig. II. Through the points determined f the standard preparation only one straight line can be drawn, a the points obtained from the unknown sample are very well repr sented by the straight line given. The horizontal distance betwe these two lines is log. $x = 0.175$, and we obtain the strength the unknown by subtracting log. 20 — log. $x = 1.301 - 0.175$ 1.125. Antilog. 1.125 = 13.34 units per mg. The mean error this result can be made out in the usual way by measuring t horizontal distance of each point from the corresponding lin

When we have the mean error on the standard line ε, and on the line for the preparation under assay ε_1, the mean error of the result is $e = \sqrt{\varepsilon^2 + \varepsilon_1^2}$. In the case under discussion we have $\varepsilon = 0.006$, $\varepsilon_1 = 0.014$, and $e = 0.015$. This figure is a logarithm, and we have the number of units per mg. for the unknown preparation Antilog. $1.125 \pm 0.015 = 13.34 \pm 0.46$, that is a mean error of ± 3.5 per cent. Instead of using the graphical method here described, the parallel lines and their horizontal distance can be worked out arithmetically by the method of least squares.

When changes in the sensitivity of the whole stock of mice make their appearance during a determination of this kind, the curves obtained are much less regular. The accuracy with which the straight lines can be determined is diminished, and it may even become impossible to determine them at all. To obtain even then results of sufficient accuracy, the assumption regarding the strength of the unknown preparation should be as nearly correct as possible, and such doses should be given that, in each test, the same percentage number of falls is obtained in the two groups receiving the standard and the unknown sample respectively. Each test is therefore used as a guide to the next. If in the first test the unknown preparation produces a smaller number of falls than the standard, it must be weaker than assumed. The probable strength is then found by interpolation in the normal curve and the result used in the next test. By this method each test is made to give an independent determination of the unknown, and, even with large simultaneous variations in the general sensitivity, reliable results can be obtained.

It has been asserted by Laqueur and Grevenstuk that the incidence of convulsions in rabbits depends not only on the insulin concentration but also on the purity of the preparation, in the sense that impure preparations producing the same lowering of the blood-sugar are more liable to produce convulsions. A relation of this kind might conceivably be present also in mice, and be the source of grave systematic errors making the purest preparations relatively too strong, as regards their therapeutic effect on the blood-sugar. We have therefore instituted a series of comparisons between the blood-sugar test, as described by Marks, and the mouse test. The private standard of the Nordisk Insulin Laboratorium, which had been compared by means of the mouse test, and made to correspond to the international within a mean error of ± 5 per cent, was compared also in five experiments on two to four rabbits each, and found to be 94, 95, 96, 96 and 99 per cent of the international unit, with an average of 96 ± 3.5 per cent. The weight per unit of our standard is 0.085 mg. as against the 0.125 mg. of the international. We have, further, compared a pure preparation of 0.058 mg. weight per unit with the corresponding concentrated extract before final purification, and found that the blood-sugar method on rabbits showed the same relative strength for the extract in proportion to the pure powder as the mouse method. In a final test we have compared the raw primary extract with the concentrated. In this case the concentrated extract, which

contains only a fraction of the impurities of the primary, did sho a slightly higher relative concentration according to the bloo sugar method than according to the convulsive-dose method, b the difference was well within the limits of error of the determin tion. We can safely conclude, therefore, that there is no systemat difference, depending on purity, between the two methods.

According to our experience, which is, of course, somewh limited with regard to the blood-sugar method, there is not mu to choose regarding the amount of work necessary to obtain definite degree of accuracy by the two methods. The mouse meth requires a special piece of apparatus — the large incubator, b we believe that the tests can be carried out by less skilled worker

8.

THE STANDARDISATION OF INSULIN BY THE DETERMINATION OF THE CONVULSIVE DOSE FOR MICE

By J. W. Trevan and Ellen Boock

(Wellcome Physiological Research Laboratories, Beckenham, Kent).

The obvious simplicity of using convulsions as an indicator in the assay of insulin has led to the development of several "convulsion methods"; one, of which the most complete description has been published, is that of Voegtlin. We have been using mice for the standardisation of insulin since the early part of 1923, and have gradually arrived at the method described below in detail in which some 30 mice of a given stock are injected with a standard sample of insulin and 30 others with the batch of insulin under investigation. The animals are kept during the test at 38°C. and the comparison of the percentages showing convulsions within a limited time enables a determination of the activity of the batch under test to be made. The method gives results parallel to those of the rabbit test and we use it as a routine for all our tests.

Method.

Mice are fed, preferably for at least a week after receipt, on white bread and excess of milk. They are kept in batches of 200 in large cages, $5' \times 3' \times 1'$, with perforated zinc tops. The animals required are removed to an empty cage at 5 p.m. on the day previous to a test and deprived of food. During the test, which is made at any time from 9 a.m. to 4 p.m., the mice are kept in zinc boxes about 5″ cube, which are for three-quarters of their height immersed in a water bath at 38°C. The boxes are covered with glass lids and perforations are made around the top of the walls for ventilation (Fig. 1). The apparatus should be shielded from draughts. The mice are injected subcutaneously with a dilution of insulin in a dose of 0.0075 to 0.01 clinical units per 20-gram body-weight. Immediately after the injection the mice are transferred to the heated boxes, six mice in a box, of which three are injected with the insulin, the activity of which is under investigation, and three with a dose of some standard sample of insulin. Sixty mice are put up at each test and four tests in all are made. The number of animals which show symptoms or die during two hours is then

observed by inspecting the boxes at ½, ³/₄, 1, 1½, and 2 hou
Most of the mice developing symptoms of hypoglycæmia do so
the first hour. The symptoms vary from violent convulsic
down to muscular atony. There is some difficulty in determini
the minor degrees of hypoglycæmic effect and in cases of dou
we lay the mouse on its back. If it does not turn over immediat

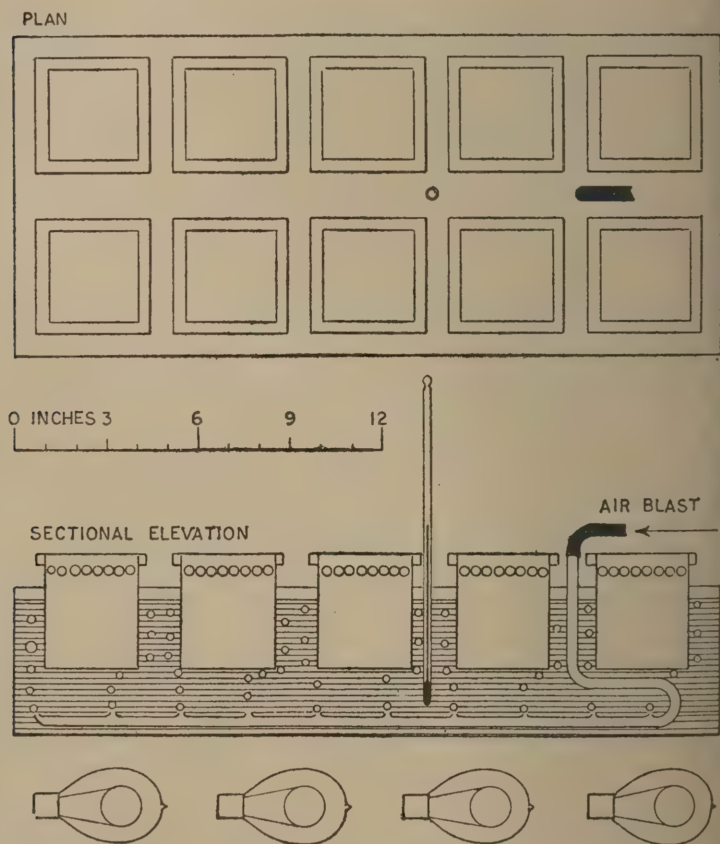


Figure 1.
Apparatus for keeping mice at 38°C.; described in text.

we consider it to show "symptoms". The intravenous inject
of glucose causes the animal to recover immediately. Exami
tion of the mice must be made rapidly, to prevent fall of tempe
ture.

Table 1 gives the results of a series of experiments with the n
International Standard, referred to as "New Standard", and w
the dry preparation in current use in England as a standa
referred to as "Old Standard". The first column gives the d
of the powder in thousandths of a milligram, used for a 20-gr

mouse, the size of the dose administered being in direct proportion to the weight of the animal. Subcutaneous injection was used in all cases, suitable dilutions with saline being made so that 0.5 c.o. was injected for 20-gram body-weight.

In Experiments 1 and 4, simultaneous experiments with the new and the old standards were made. In Experiments 5 and 6, all the mice were injected with the new standard with the object in view of establishing on a large number of animals the form of the dose-convulsion curve. The experiments were each done on a different

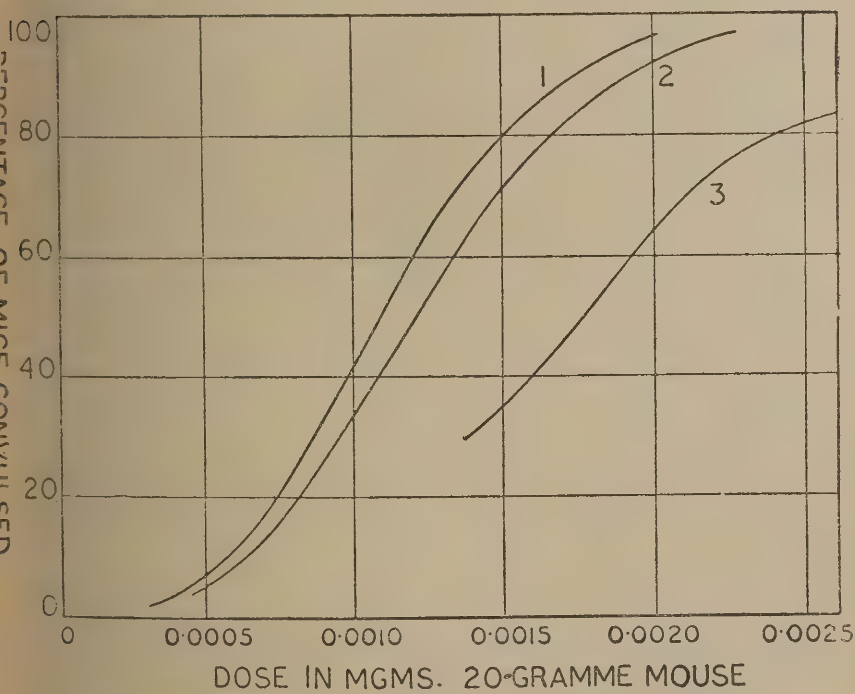


FIGURE 2.

Convulsion-dose curves at 38°C. for the international standard insulin (1), and the current English standard (2), from the figures of Experiment 4. The abscissæ of curve 2 are 10 per cent larger than those of curve 1. Curve 3 is the same as curve 1 except that the abscissæ are increased by 60 per cent. It fits the points obtained in Experiment 3, and illustrates the mass variation of the whole stock of mice which occurs at times. As will be seen from the table, although the susceptibility of the mice on this occasion was very much less than the average, the calculated ratio between the activities of the two samples of insulin was substantially the same as on the days when the susceptibility of the mice was much higher.

date, the investigation spreading over about six weeks. Under "mice convulsing", the numbers of mice convulsing are given in the form of fractions, the numerator representing the number showing symptoms and the denominator the total number injected.

The mice represented in each horizontal line in Experiments 1 t were chosen haphazard from the same group and were arran after injection so that each box contained three injected with new and three with the old standard in order to ensure as fa possible equality of temperature and other conditions. Some the results obtained are plotted in Fig. 2. These figures sl that the percentage of mice which develop convulsions wit given dose varies on different days. For this reason, the mo convulsive dose can only be used for the comparison of the rela activities of two samples of insulin, and figures for the rela activity are calculated from the respective convulsion rates for two samples when injected at the same time by a method wl depends on the following considerations. In Fig. 2, the full- curves 1 to 3 are all the same curve drawn to different absci scales. It will be seen that each of the curves fits one or ot of the series of points obtained with a fair degree of accura Curve 1 fits the points obtained in Experiments 4 and 5 for "new" standard; Curve 2 the points obtained for the "o standard in Experiment 4; Curve 3 those for the "old" stand in Experiment 3. The actual deviations between the smoot curve and the observed points are, of course, due to the statist error of sampling, which will be discussed later, but the smoot curves may be taken to represent with sufficient accuracy points which would be obtained if indefinitely large groups animals could have been used to establish them.

Since the difference between each curve is only one of absci scales, it follows that for all the experiments the relation betw *percentage* increment of dose and percentage increment of con sion rate is constant, when sufficiently large groups of mice taken. For example, with Curve 3, raising the dose from to 2.4 (a rise of 50 per cent) caused an increase in convulsion r from 40 to 80 per cent. With Curve 1, to produce an incre in the convulsion rate from 40 to 80 per cent the necessary d rises from 1.0 to 1.5, which is the same percentage increase dose as before.

Similar results will be obtained with any other pair of convuls rates. The interpretation we place upon this is the followi The curves each represent integrated frequency curves of variation in susceptibility of the individual mice in any one gro The slope of the curve when drawn to a scale taking 50 per c mortality as unit dose is a function of the coefficient of variat of the susceptibility of individual animals. The figures show t day-to-day variations affect the mean individual susceptibility do not affect appreciably the distribution of the individual susc tibilities around the mean, *i.e.*, the coefficient of variation unchanged. The variation of the factors, whatever they which cause periodic variation in the mean susceptibility is co pletely uncorrelated with the individual susceptibility of animal.

As a result of these and other similar observations, we take it established that the shape of the convulsion-dose curve is const

for all groups of mice treated as described, although the absolute values of the abscissæ vary, and we adopt the following procedure for the calculation of the relative activity of two solutions of insulin which have given different convulsion rates on two groups of mice injected at the same time. A curve such as 1, obtained by the simultaneous injection of a large group of mice on the same day, is constructed and used as a reference curve. Then, although this curve does not give for every group of mice the absolute values of the activity of a dose of insulin which causes any observed proportion of convulsions, it can be used to calculate from the convulsion rates obtained the ratio of the activities of doses of any two samples of insulin injected into two groups of mice at the same time. In Experiment 1 *a*, as an example, the ratio of activities of the two is estimated by taking the reference curve (such as Curve 1) and reading off from the curve the doses which, on the date on which the curve was made, give mortalities of 6 and 8 respectively out of 30. The doses giving this convulsion rate in the group from which Curve 1 was made were 0.75×10^{-6} grams and 0.805×10^{-6}, a ratio of 1.00 to 1.07. Using any one of the other curves, the proportion will, of course, be the same since the different curves differ only in abscissal scale. Since the "new" and the "old" standards were injected in doses of the same weight in the experiment under discussion (1*a*), the activity of the "new" standard is 1.07 times that of the "old" according to this particular experiment. In Experiment 2*a*, with a larger dose of each, 15 out of 30 convulsed with the "old" and 18 with the "new" standard. Fifty per cent mortality when Curve 1 was obtained corresponded to 1.1×10^{-6} and 60 per cent to 1.2×10^{-6}, a ratio of 1 to 1.09. The activity of the "new" standard therefore is 1.09 times that of the "old' standard according to Experiment 2*a*. In such a manner were all the figures in the last column obtained. The discrepancies amongst them are, by pure chance, smaller than are to be expected in such a series. That there are discrepancies chiefly depends on the inevitable error of sampling. If 50 per cent of a very large group of animals would be thrown into convulsions by a given dose "*a*" per unit weight of mouse, the probability is small that "*a*" would cause 15 to convulse out of a group of 30 chosen haphazard from the large group. The probability that the deviations from the true value due to the small size of the sample will be not greater than any given value can be readily worked out from the standard probability formula. The discrepancy produced in the final evaluation of the ratio between two specimens of insulin in the manner laid down above depends not only on the deviations in convulsion rate due to sampling errors but also on the slope of the convulsion-dose curve. If the convulsion-dose curve were nearly perpendicular to the abscissa, any deviation due to sampling would alter the final value assigned to the ratio very little. With a sloping curve such as the one actually obtained for insulin, the error is considerable. It is approximately 360 to 1 (corresponding to three times the standard deviation) that the error oi the comparative values assigned when

using this test for insulin will not exceed 34 per cent with a 75 pe cent convulsion rate when 30 mice are used in each group. Th figure is obtained by determining from the curve the increment o dose which corresponds to the standard error involved in usin two groups of 30 mice each. The whole question of the accurac of determination of toxicity is being made the subject of a separat paper. The majority of the estimations will, of course, fall betwee closer limits than these, as is the case in the series of experiment under consideration. The average value of the "new" standar as a percentage of the "old" as given by these tests is 110 per cen Since 490 animals were injected in each group altogether, the non significant range of error is of the order of 10 per cent (calculate graphically). The difference obtained is therefore of the order o difference which is not significant, but the result indicates that th activity of the "new" standard is almost certainly not less tha 100 per cent nor greater than 120 per cert of the "old" standard The standard error for the figures in the last column of Table was also worked out by the root mean-square method, and give 6.2 per cent as the significant range, but the higher figure give above is probably more accurate.

The apparent difference in the two samples is shown graphicall in Fig. 2. The points obtained for the "new" and the "old standard in Experiment 4 lie along Curves 1 and 2 respectivel of which Curve 2 is constructed with abscissæ 10 per cent greate than Curve 1.

We have investigated various factors which might interfer with the use of the method.

Temperature at which experiment is carried out. It was due to pr vate information received through Dr. Dale from Prof. Krogh that w tried keeping the animals warm after injection. He recommende 28°C., but we have found that better results are obtained b keeping the boxes at 38°C. (Fig. 3). The shape of the convulsion dose curve as given (for 28°C.) is only approximate because of th statistical difficulties of obtaining points for such a flat curve, bu it represents the order of difference from the 38° curve. Th difference in shape indicates that the less sensitive animals ar more affected by the low surrounding temperature than the mor sensitive. It is obviously quite hopeless to attempt to standardis insulin on our mice at room temperature, or even at 28°C, an comparisons by the method described above are invalidated i the temperature at which the comparison is made differs from th temperature at which the standard curve was made.

The explanation we offer of the effect of temperature is th following: The temperature of mice is variable (see Table 2 and unless the body temperature is kept at 37° convulsions d not develop when the sugar falls. In addition, the fall in th blood-sugar is often accompanied by a fall in body temperatur (see Table 2), which aggravates the effect. By keeping the anima at 38°C. the body temperature is maintained. Huxley has show that the rate of action of insulin in cold-blooded animals increase with the temperature. The temperature during the first half-hou

or so is the most important. We injected 50 mice at 29°C. with insulin and 50 at 38°C. In the first group one convulsed in one hour, in the second group 32. When the temperature of the first group was raised to 38°C. in the second hour, 23 mice altogether convulsed. We have the impression that it is better not

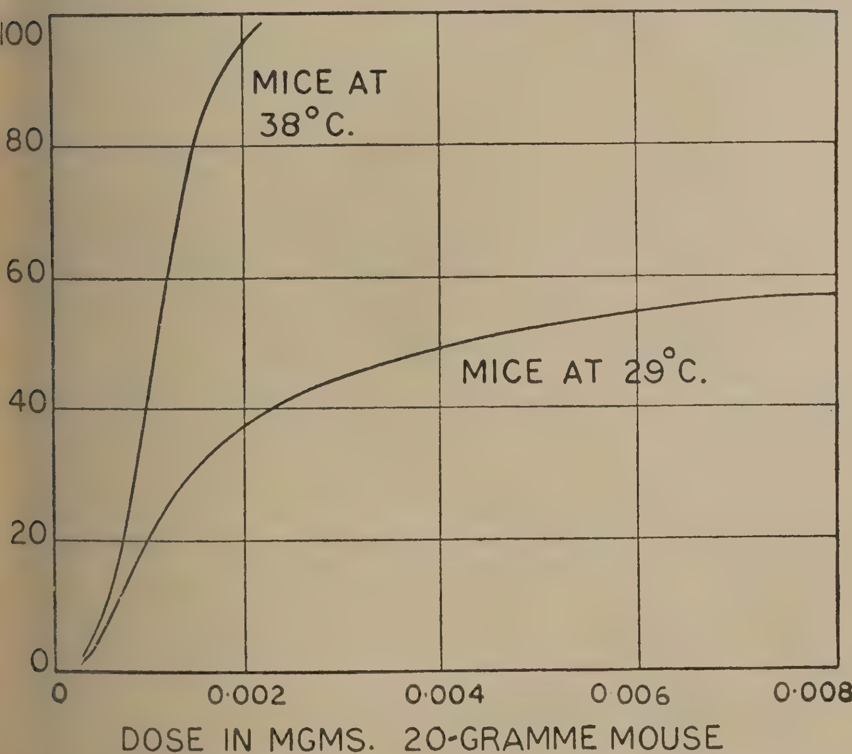


FIGURE 3.

Convulsion-dose curves for mice injected with insulin at room temperatures of 38°C. and 29°C. respectively.

to warm the mice before injecting them, as the mice which have been long in the boxes at 38°C. are rather less sensitive than those which have not been previously heated. The temperature of such a small object as the mouse rises very rapidly to that of its surroundings at 38°C.

Diet. Bainbridge has shown in these laboratories that increase of the ratio between fat and carbohydrate in the diet diminishes the sensitiveness of mice and rats to insulin. We have found that for three or four hours after the last meal the sensitiveness of mice is decreased, but after this, and up to 22 hours at least, no evidence of alteration of sensitiveness can be obtained (Table 3).

Weight. Table 5 gives the result of an analysis of figures obtained over some months. Animals weighing less than 15 grams are slightly more sensitive than those weighing more. The difference has been ignored.

Colour. The colour of mice has no significant effect on sensitiveness (Table 4).

Route of injection. The choice of intravenous, subcutaneous or intraperitoneal injection has no effect in mice on the number convulsing, although convulsions occur sooner when the route chosen is the intravenous one.

Discussion.

One of the factors which led us to the adoption of this method was the necessity for dealing with large numbers of tests for experimental purposes. For preliminary tests we use smaller groups and for rough estimates 10 mice are sufficient. A single worker, with the assistance of one boy, can do rough tests of 15 samples in a day, using 10 mice per group, or five samples using 30 mice in each group. The method has also the advantage that less technical skill is required than for the performance of the rabbit test. On the other hand, as has been pointed out to us by Marks, the method has the theoretical disadvantage that the degree of hypoglycæmia is not estimated directly but only by the occurrence of convulsions, and it is well known that convulsions in the rabbit, and probably in the mouse at room temperature, are not an inevitable consequence of any given degree of hypoglycæmia. We have stated reasons for supposing that the effect of raising the temperature of mice to 38° is to increase the number of animals which convulse when the blood-sugar falls, but we recognise that the conditions at 38° are probably not such that convulsions *always* follow the same degree of hypoglycæmia. The lack of correlation between convulsions and hypoglycæmia would render the convulsion test much less useful than the direct measurement of blood-sugar, were it not that the number of independently variable factors which affect the degree to which the blood-sugar falls is already so large that the effect of the addition of one other variable, namely, the variability of the convulsive response to hypoglycæmia, can be compensated by a reasonable increase in the number of animals used. We have found good agreement within the limits of experimental error between the rabbit method and the method described above, and the possibility of obtaining comparable results by different methods on two species of animals adds to the confidence with which the results obtained by either method can be regarded.

Summary.

A method for the comparison of different samples of insulin using a convulsive dose for the mouse as an indicator is described. Using this method, the international standard is estimated to

ntain 8.8 clinical units per milligram, with a standard deviation 0.266, assuming the current standard to contain 8 clinical nits per milligram.

BAINBRIDGE: *Journ. of Physiology* (in the press).
HUXLEY: *Nature*, 1923, 113.
VOEGTLIN, DUNN and THOMPSON: Public Health Reports, ugust 1924; 39, 1935.

TABLE 1.

xp. No.		Dose per 20-gram mouse Grams × 10⁻⁶	Mice convulsed Old standard No.	Per cent	New standard No.	Per cent	New standard as percentage of old
1	*a*	0.94	6/30	20	8/30	26.6	107
	b	1.25	15/30	50	18/30	60	109
2	*a*	1.6	14/30	46.6	18/30	60	119
	b	1.6	14/30	46.6	15/30	50	107
3	*a*	1.6	12/30	40	12/30	40	100
	b	1.9	18/30	53.3	20/30	66.6	115
	c	2.2	19/30	63.3	22/30	73.3	108
4	*a*	0.94	20/60	33.3	24/60	40	113
	b	1.25	34/60	56.6	39/60	65	109
	c	1.6	20/30	66.6	25/30	83.3	126
	d	1.9	26/30	86.6	27/30	90	105.5
5	*a*	0.625			10/30	33.3	
	b	0.94			14/30	46.6	
	c	1.25			19/30	63.3	
	d	1.57			26/30	86.6	
	e	1.875			28/30	93.3	
	f	2.2			29/30	96.6	
6	*a*	0.78			4/30	13.3	
	b	0.94			10/30	33.3	
	c	1.1			14/30	46.6	
	d	1.25			36/60	60	
	e	1.4			40/60	69.6	
	f	1.6			49/60	81.6	
	g	1.7			54/60	90	
	h	1.875			28/30	93.3	

TABLE 2.

	External temperature	Body temperature of mice	Number of mice	Number of mice convulsed
Normal	19°	34.8°	20	
After Insulin . .	19°	31.2°	20	3
Normal	22°	32.8°	17	
After Insulin . .	22°	30.5°	17	0
Normal	38°	37.95°	30	
After Insulin . .	38°	37.1°	27*	15

* 3 dead.

TABLE 3.

Effect of Feeding on the Response of Mice to Insulin.

No food since previous day. Standard dose.	Food not removed. Standard dose.	Just fed. Standard dose.	Just fed. 1.14 standard dose
21/30	16/30	4/30	10/30

TABLE 4.

White	Black	Black and white	Other colours	*Total*
24/33 = 73%	11/15 = 73.5%	33/45 = 73.5%	124/167 = 74.3%	192/260 = 73.9%

TABLE 5.

Effect of Weight on Response of Mice to Insulin.

Total convulsed	Under 15 grams	15 grams and over
184/251 = 73.3%	93/124 = 75%	91/127 = 71.5%

9.

THE BIOLOGICAL ASSAY OF INSULIN PREPARATIONS IN COMPARISON WITH A STABLE STANDARD

By H. P. Marks

(Department of Biological Standards, National Institute for Medical Research, London).

Introductory.

The observation originally made by the Toronto workers, that insulin produced a rapid fall in the blood-sugar of the normal rabbit and that definite nervous symptoms—hypersensitiveness, inco-ordination and convulsions—usually made their appearance when the blood-sugar had fallen to a level of about 0.045 per cent, suggested an obvious means of standardising preparations of insulin and of establishing a unit of potency. The original rabbit unit was, in fact, defined as the smallest dose which would lower the blood-sugar of a 2-kilo rabbit, starved for 24 hours previously, to the convulsant level of 0.045 per cent, and this unit, with the clinical unit based on it (1 rabbit unit=3 clinical units), has been generally accepted.

All previous methods of assay based on this definition, whether they involved the observation of actual convulsions or of the fall in blood-sugar produced by a sub-convulsive dose, have aimed at determining the potency of a sample of insulin absolutely in terms of an animal reaction.

A serious difficulty for any such method is presented by the wide range of variation in response by different individuals of the same species. This difficulty could be overcome if individual rabbits could be standardised for their reaction to a known dose of a standard preparation and if the reaction of a rabbit so standardised could be regarded as constant. This was the procedure which we for a time adopted, using as a standard of reference a sample of insulin solution which was placed at our disposal by the courtesy of Messrs Eli Lilly & Co. and which had been carefully standardised by them and by the Toronto Insulin Committee. In order to obtain evidence as to the most suitable basis of measurement, it was desirable, in the first instance, to investigate the

relation between dosage and physiological effect, whether actua convulsions or hypoglycæmia. Fifty rabbits were therefor tested on each of a series of doses of this standardised preparatio and the percentage of convulsions and the average hypoglycæmi effect were worked out for each dose. Since the same rabbit were used throughout the test, individual variations, so far a these could be regarded as constant, were eliminated.

Fig. 1 shows the percentages of rabbits which convulsed o different doses of the preparation. From the data supplied b Messrs Eli Lilly, it would appear that a dose of 1.05 units per kil should produce convulsions in between 60 and 70 per cent of th rabbits injected. Actually, we found this dose to produce con vulsions in 54 per cent of our rabbits, which appear, therefore to be slightly less sensitive than those employed in the Lilly labo ratories. The curve so obtained indicates that, when the sam rabbits, in sufficiently large numbers, are used for a series of doses there is a reasonably good proportionality between the percentag of convulsions and the size of the dose over a certain range o dosage. There are serious drawbacks, however, to the use o convulsions in rabbits as a practical indication.

In the experience of this laboratory, as also in that of Macleo and Orr, it has been found repeatedly that convulsions may fai to occur in a rabbit injected with a dose which produces them i others, for either of two distinct reasons. The rabbit may b abnormally insensitive to the action of insulin on the blood-sugar so that this only falls to a trivial extent, or, on the other hand the rabbit may be quite normally sensitive, according to the indica tion of the effect on its blood-sugar, but show practically n symptoms.

We might distinguish these two types of insensitiveness to th convulsant action of insulin as "metabolic insensitiveness" an "nervous insensitiveness". The latter condition, in which th rabbit may exhibit no overt abnormality, though its blood-suga fall as low as 0.03 per cent, can apparently be developed to som extent by habituation. It is certainly much commoner in rabbit which have been used for many tests with these larger doses tha in those which have been so treated but a few times.

In view of these facts, it is obvious that no reasonably accurat estimate of the activity of a sample can be made from the propor tion of convulsions observed on a small number of rabbits; and indeed, we are informed that those who have used this method with success have found it necessary to use relatively enormous numbers in order to obtain consistent results.

Attention was therefore directed to determining as accurately as possible the hypoglycæmic response to a subconvulsive dose as involving fewer factors of possible variation than those which must complicate the tests based on observation of convulsions o death and as representing more closely the effect which it is desired to produce in the diabetic. As Macleod and Orr point out some samples of insulin cause a rapid and pronounced fall in the blood-sugar, followed by an equally rapid recovery, while others

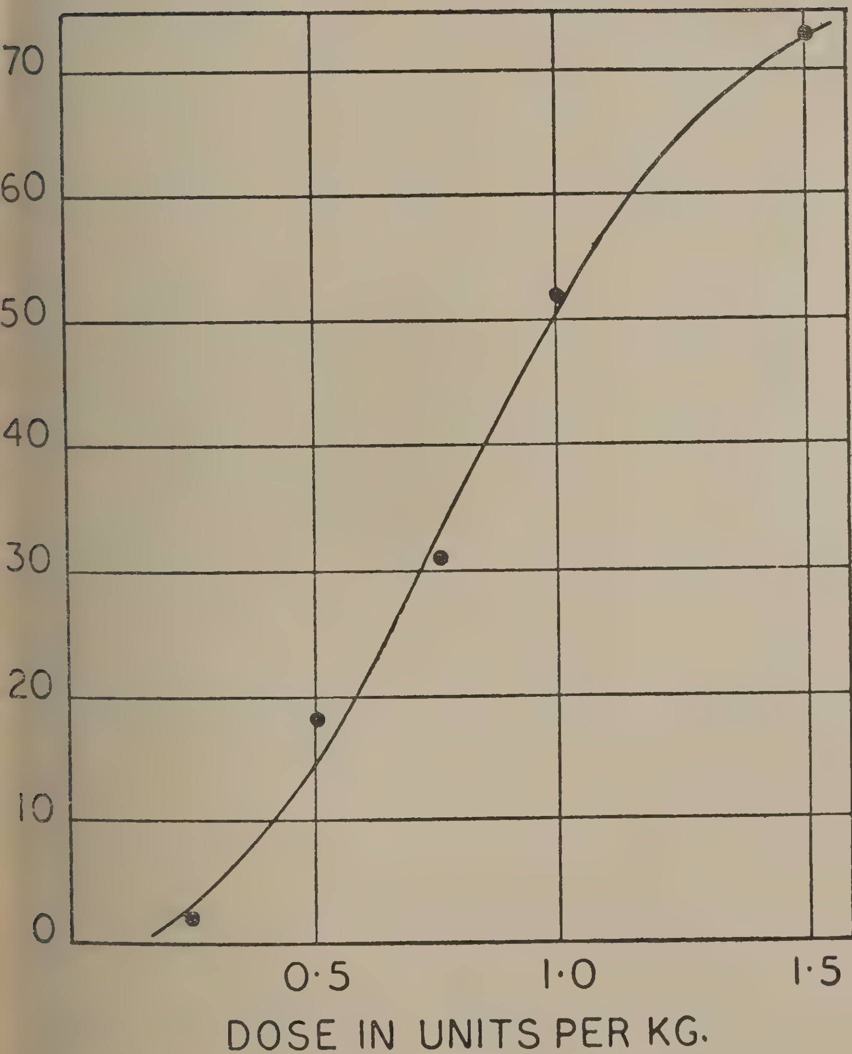


FIGURE 1.
Relation of frequency of convulsions to dosage. (50 rabbits tested.)

cause a more gradual and prolonged hypoglycæmia. The interests of the diabetic would appear to be best served by the preparation which produces the greatest *average* fall of blood-sugar, so that we take as a measure of the hypoglycæmic effect the average fall of the blood-sugar below the initial level over the period of the experiment. The procedure is somewhat similar to that of Macleod and Orr. A sample of blood for the estimation of the normal fasting blood-sugar is taken immediately before the injection, and further samples at every hour subsequently over a period

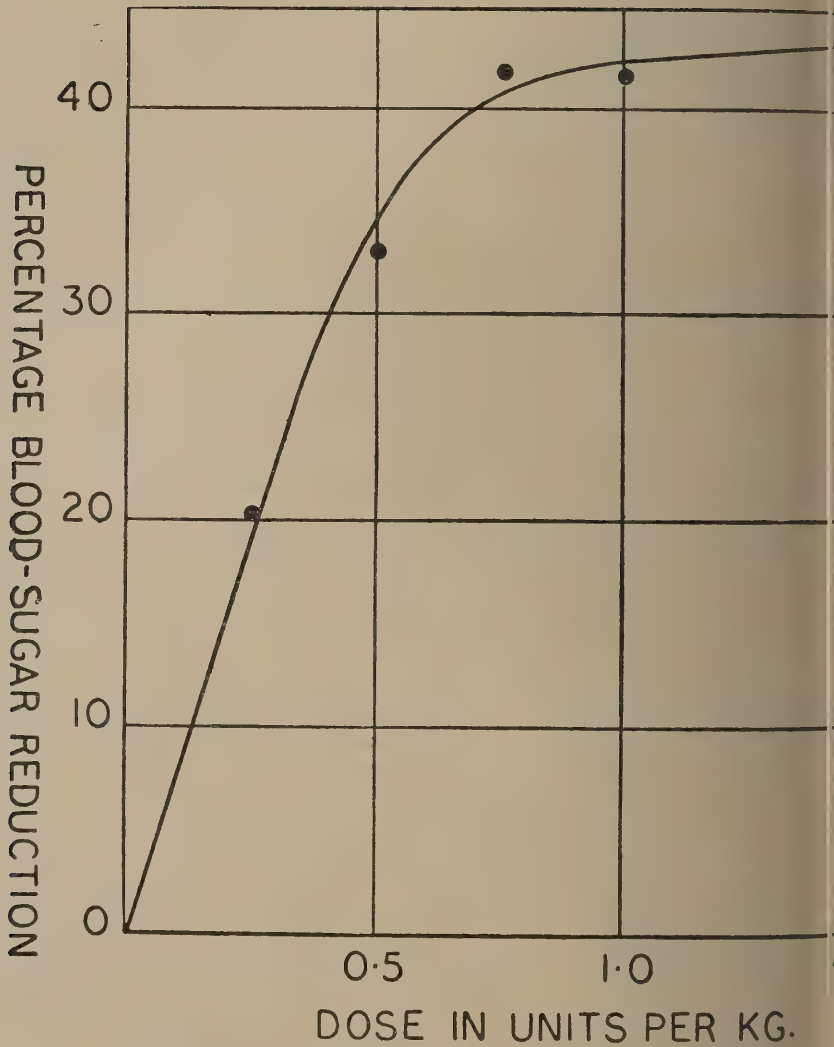


FIGURE 2.
Relation of hypoglycæmic effect to dosage. (Average of 40 rabbits.)

of five hours. It is felt that by this means a more accurate pictur of the hypoglycæmia following the injection is obtained tha by determining the blood-sugar level at only three intervals, a in Macleod and Orr's procedure. The period of five hours for th duration of the experiment is adhered to, as in our experience th blood-sugar usually returns to the initial level within this period The average fall in blood-sugar—that is to say, the mean of th five hourly values after the injection subtracted from the initia value—is expressed as a percentage of the initial blood-sugar since there is some evidence that a high initial blood-sugar is mor

sily reduced by insulin than a low one. The following example ustrates the procedure: initial blood-sugar 106 mgs. per c.c., ood-sugars at 1, 2, 3, 4 and 5 hours after the injection—65, 64, 3, 88 and 99 mgs. per c.c. respectively. The mean of the figures r the five hours following the injection is 80, so that the figure r the hypoglycæmic effect is $\frac{106-80}{106} \times 100 = 24.5\%$. This e call the "percentage blood-sugar reduction", and it forms the asis for our measurements of the hypoglycæmic effect of a given ose of insulin.

Of the 50 rabbits tested on the standardised sample and giving he curve shown in Fig. 1, 10 developed, on the higher doses, onvulsions of such severity that glucose had to be injected. In he remaining 40 it was possible to complete the five-hour experiment n spite of convulsions. The average percentage blood-sugar reducion for these 40 rabbits on the various doses is shown graphically n Fig. 2. It will be observed that, on the lower doses, on which nly a few very sensitive rabbits convulse, the hypoglycæmic ffect is approximately proportional to the dose, but that, as the onvulsive dose for the majority of rabbits is approached, the ypoglycæmic effect reaches a limit, above which there is practically o further increase, however large the dose. From an inspection f the curve, it will be quite clear that any dose above 3/4 unit per ilo will produce approximately the same hypoglycæmic effect, o that it will be impossible to distinguish between samples of different potencies on these higher doses. With the rabbits used in this comparison, or with any rabbits of the same general level of sensitiveness, it is essential to employ a dose smaller than 3/4 unit per kilo, in order to obtain hypoglycæmic effects varying approximately with the dose. On the other hand, provided this upper region of practically unvarying effect is avoided, the dose should be as large as possible, so that the effect shall not be so small as to give undue prominence to experimental errors. For the purpose of comparing the potency of a sample with that of the standard, therefore, a dose of 1/2 unit per kilo has been adopted.

The relation between dosage and effect having been thus determined, and the decision having been taken to use the percentage blood-sugar reduction as the measure of action, it was now necessary to consider what measures could be taken to eliminate the errors introduced by individual differences and periodic fluctuations in the response of the rabbits. Obviously individual differences, so far as these are characteristic and constant, can be eliminated altogether by using the same animals in succession for the test on a standard preparation and on the unknown sample. Unfortunately, such constant reaction by the individual rabbit cannot be assumed. Control experiments, in which the same group of rabbits received the same dose of the same preparation once a week, brought to light the fact that each rabbit showed, in varying degree, fluctuations of response on either side of its characteristic average.

It might be supposed that if a sufficient number of animals were used these fluctuations would tend to cancel one another; we found,

on the contrary, a pronounced tendency to a simultaneous rise fall from the characteristic averages, affecting all the rabbi together.

No increase in the number of animals used could eliminate su variations affecting the whole stock. On the other hand, if t variations were really simultaneous and equal, we could elimina their effect entirely by dividing the rabbits used for the test in two equal groups, one receiving the sample under test and the oth the standard preparation, and then repeating the test a few da later with reversal of the groups. This is the method which h been in use here for some time and which has been used in t evaluation of the international standard.

It is not suggested that the periodic fluctuations really show t strict parallelism required to make the method perfect. In fac different animals would appear to vary in their tendency to the fluctuations. All that is claimed is that the method, by ensuri that each rabbit receives both the sample under test and the sta dard, and that the effect of day-to-day variations is spread evenly as possible over the whole series, eliminates the effect permanent individual differences altogether and that of period variations to the greatest possible extent.

Details of Method.

(i) *Choice and care of stock.*

As neither the individual nor the periodic variations in respon to a given dose of insulin appear to bear any relation to the bre of rabbit, no restriction in the choice of animals is imposed by the considerations. Greater uniformity in response, however, is aim at by eliminating from the stock all rabbits in which a dose one clinical unit per kilo produces convulsions (usually abo 15 per cent of the rabbits) and all those which prove to be abno mally insensitive. Rabbits with an excitable temperament shou be discarded, since their handling during a test may cause serio fluctuations in the blood-sugar level.

It is our practice to take animals into use at a weight of abo 2 kilos, and to discard them when the weight reaches 3 kilo so that, from the point of view of long service, we prefer employ a light breed of rabbit.

It is the general experience of this laboratory that in hot weath the effect of insulin is more prolonged, while in cold weather t recovery is more rapid. The temperature of the animal room, a of the room in which the tests are carried out is therefore maintain as nearly as possible at 65° F. throughout the year.

The diet consists mainly of oats (about 100 grams per day f a 2-kilo rabbit), with cabbage leaves, and fresh grass when obtai able. A diet containing swede turnips was discontinued, owing the rapid decrease in sensitiveness which followed its adoption.

Twenty-four hours before a test, all food and hay are remov from the cages of the rabbits to be used, but water is left in the cag till just before the commencement of the test. Rabbits should n

e used more than twice a week, and the stock should be large enough o enable each rabbit to have a frequent rest.

i) *General procedure.*

A batch of not less than six rabbits having been prepared for est by withholding food as above, samples of blood for the estimaion of blood-sugar are obtained from the lateral ear-vein, a igorous circulation being promoted by warming the ear over a arbon filament lamp and by friction, if necessary. Slightly more han 1 c.c. of blood is collected in a small glass vessel containing trace of powdered potassium oxalate, and the estimation of bloodugar carried out according to the method devised by Shaffer and Hartmann (1920). This method lends itself well to the estimation of a large number of blood-sugars, but any other suitable method nay be used.

A sample of blood for the estimation of the normal fasting bloodsugar is taken immediately before the injection, and further samples at every hour subsequently over a period of five hours.

The injection is given subcutaneously. To obtain a suitable volume for injection, commercial samples of the usual strength, namely, twenty units per c.c., should be diluted ten times with distilled water, and the appropriate volume injected with a "tuberculin" syringe.

Half the rabbits are injected with a dose of the standard preparation (suitably diluted as above) adjusted to the weight of the rabbit, and representing one clinical unit per 2-kilo rabbit, while the other half are given a theoretically corresponding dose of the sample under test. After an interval of at least three days, the test is repeated on the same batch of rabbits, with the difference that the rabbits which previously received the standard are now injected with the unknown sample and *vice versa*.

It has been our custom to adjust the dose to the weight of the rabbit, but there seems to be no reason why, for this strictly comparative test, body-weight should not be regarded as an individual characteristic for the short period occupied by the test, and the simpler plan adopted of giving all the rabbits the same injection, regardless of their weight. In this case, however, it would probably be desirable to set narrower limits on the weights of the animals used.

Having calculated, in the manner already described, the percentage blood-sugar reduction for each injection, we now find the sum of all the figures for the two days relating to injections of the sample under test, and of all those similarly relating to injections of the standard. A comparison of these two totals will then indicate whether the particular dose of the sample under test is more or less active than that of the standard preparation, and approximately the extent of the difference.

By reference to the table on page 68 relating hyperglycæmic effect to dosage, a preliminary estimate can be made as to the degree of divergence between the activity of the sample under test and that of the standard. Experience indicates, however, that the most

reliable results are obtained when the dosage of the unknov preparation is adjusted so as to be as nearly as possible equivale to the dose of the standard preparation. If, therefore, the prelir inary estimate indicates a discrepancy greater than 5 per cent, further test must be carried out, the dosage of the unknown prep ration being readjusted on the basis of this estimate. If the resul still differ by more than 5 per cent, further readjustment and co firmatory test must be made, until agreement within these limits obtained.

Trial of the Method.

The essential requirements for the validity of the method, appli in the manner described above, are that equally active doses shou give equality of effect and that differences in dosage should made manifest by detectable differences in effect. To what exte these requirements are satisfied may be gathered from a consider tion of the following results of experiments, in which: (i) t standard preparation was simply substituted for the unknov sample so that, in effect, the activity of the standard preparati was compared against itself; and (ii) the effects of various propo tional doses of the standard were compared with that of the standa dose of 1 clinical unit per 2 kilo. (In both cases the standard us was the interim standard referred to later, and not the origin reference sample.)

(i) *Comparison of equal doses of the standard preparation.*

The results of a typical experiment are set out below:

	Rabbits receiving standard preparation (1 unit per 2 kilos)	Percentage B. S. reduction
1st day	No. 17	40.9
	18	43.2
	20	34.1
		118.2
2nd day	No. 43	40.8
	44	37.9
	45	37.1
		115.8
Total for both days		234.0

Rabbits receiving sample (in this case = standard preparation)) (1 unit per 2 kilos)	Percentage B. S. reduction
No. 43	37.0
44	36.0
45	41.5
	114.5

Rabbits receiving sample (in this case = standard preparation) (1 unit per 2 kilos)	Percentage B. S. reduction
No. 17	38.1
18	45.0
20	39.6
	122.7
Total for both days	237.2

It will be seen that the two totals are reasonably close. It will be convenient to represent the divergence from absolute equality by expressing the difference between the two totals as a percentage of their mean, thus: $\frac{237.2-234.0}{\frac{237.2+234.0}{2}} \times 100 = 1.4$ per cent. This implies that, had the injections under the heading "sample" actually consisted of a sample exactly equal in potency to the standard preparation, the potency of the sample would have been estimated as 101.4 per cent in accordance with the results of the above test. 1.4 per cent therefore represents the limit of accuracy of this particular test.

In order to demonstrate the advantages of the cross-over method over a comparison obtained simply by injecting a batch of rabbits with the sample on one occasion and with the standard preparation on another occasion, it is necessary to assume in the above test that all the rabbits received on the first day, say, an injection of the sample, and, on the second day, an injection of the standard preparation. Under these circumstances, the totals for the sample and the standard would be in the above instance $118.2+114.5 = 232.7$ and $115.8+122.7 = 238.5$ respectively and the percentage difference $\frac{238.5-232.7}{\frac{238.5+232.7}{2}} \times 100 = 2.5$ per cent.

In the example cited above, it will be observed that both the periodic fluctuations and the individual variations in response are remarkably small, so that all the totals lie close together, and a comparison by either the cross-over or the direct method gives almost equally good results.

In some cases, such a uniformity in response may be due to the use of too sensitive rabbits, in which the response to the standard dose approaches too close to the limit at which increase in dosage produces no further increase in response. Thus, a percentage reduction figure of 40 per cent represents a comparatively severe hypoglycæmia involving, in most cases, a fall in blood-sugar to the "convulsant" level at some time during the experiment. Where the responses in a particular test are abnormally high, therefore, it may be expected that differences between the sample and the standard will not be so easily detectable. To avoid this contingency,

the elimination of sensitive rabbits from the stock, as previous recommended, might with advantage be supplemented by t further elimination of all those rabbits which consistently give reaction of more than 40 per cent on the standard dose. Where t general level of sensitiveness of the animals used is high, so th large numbers of rabbits would have to be discarded, it may preferable to make the comparison of sample and standard on lower dose, *e.g.* on 0.4 unit per kilo instead of on 0.5 unit per ki

In the following example, the periodic fluctuations in respor are more pronounced and the cross-over method appears to bett advantage:

Rabbits receiving standard preparation		Percentage B. S. reduction	Rabbits receiving sample (= standard)	Percentag B. S. reductio
1st day	No. 7	52.2	No. 43	37.0
	8	29.3	44	40.6
	9	35.8	45	41.7
		117.3		119.3
2nd day	No. 43	49.6	7	39.1
	44	44.6	8	53.1
	45	41.8	9	48.6
		136.0		140.8

Percentage difference (cross-over) = 2.7 per cent
» » (direct) = 16.0 » »

Such results as these, however, are not always obtain Occasionally the rabbits show a disconcerting tendency to vary sensitiveness in such a way that the totals for the two grou into which the batch of rabbits is divided vary in opposite dir tions from one day to another, with the result that the cross-o method gives more discordant results than the direct method calculation. Such discrepancies are usually attributable to anomalous behaviour of a single rabbit. It is our experience t a rabbit which has for some time reacted consistently to a giv dose of insulin (within the limits of periodic fluctuation) may, occasion, give a wildly erratic response. The only way to elimin the errors due to this cause is to follow closely the history of e rabbit, and to use one's judgment in rejecting the results in particular case. Needless to say, if a particular rabbit gives erratic response on one day of the test, the figures for that rab on both days must be rejected, while the figures for a correspond "opposite number" in the other group must also be rejected, order to preserve the balance of the two groups. This wo certainly necessitate the use of more than six rabbits.

In all, ten tests have been performed in a similar manner to those escribed above, and the results, without any elimination of disordant figures, are collected in the following table:

Summary of tests.

	Percentage difference Cross-over	Direct
	1.4	2.5
	0.16	2.3
	2.7	16.0
	13.4	8.5
	15.8	12.0
	3.9	8.9
	1.9	5.0
	5.0	12.1
	2.5	8.5
	1.2	13.1
Standard error	7.0	9.9

The calculated error does not give the impression of a marked superiority of the cross-over method over the direct one. An examination of the two sets of figures, however, shows that, whereas the direct method gives in only two cases discrepancies less than 5 per cent, and in only three cases less than 8.5 per cent, the cross-over method gives only two figures greater than 5 per cent. If full data were available concerning the normal response of the rabbits concerned, it is very probable that the rejection of these two figures would be justified, in which case the error would be only 2.5 for the cross-over method.

On the whole, it would appear that, using six rabbits, one may expect to evaluate the potency of a sample of insulin by the cross-over method to within 5 per cent; of the total of 63 tests reported in this paper, 42, or 66 per cent, fall within these limits of accuracy.

It is considered highly desirable, however, to use a larger number of rabbits, so that erratic responses may be rejected. With this end in view, a simplified procedure has been developed and will be described later.

(ii) *Comparison of unequal doses of the standard preparation.*

As previously pointed out, it is not sufficient merely that equal doses should produce equal effects, but, further, a significant difference in dosage must give rise to an unmistakable difference in effect. In order to determine what difference in effect was produced by a difference of 10 per cent in the dosage, further tests were carried out, on the lines of those already described, with the difference that nine-tenths of the standard dose (*i.e.* 0.45 unit per kilo) was compared with the standard dose. The following figures

show the effect of nine-tenths, expressed as a percentage of the effe of the standard dose. The mean of all the tests gives a figure 94 per cent as the percentage effect produced by a dose of 90 p cent of the standard dose, while the standard deviation fro the mean is 3.1.

Percentage effect for 90 per cent dose	Deviation from mean
92.3	— 1.7
93.6	— 0.4
91.4	— 2.6
96.0	+ 2.0
89.0	— 5.0
97.9	+ 3.9
97.7	+ 3.7
92.3	— 1.7
98.5	+ 4.5
91.5	— 2.5
Mean 94.0	Standard deviation 3.1

Similar series of tests have been carried out on other proportion doses. The results are summarised in the following table, fro which the potency of a sample giving a hypoglycæmic effe different from that given by the "standard" may be rough estimated. (The figures following the ± sign refer to the "pro able error" of the mean).

No. of tests	Dose as percentage of "standard" dose	Effect as percentage of effect of "standard" dose
7	110	106 ± 0.9
10	100	100 ± 0.5
10	90	94 ± 0.7
7	80	83 ± 1.4
7	75	78 ± 2.9

Strictly speaking, the indicated relation between dosage and effe is only valid for the particular batch of rabbits from which it wa obtained, but it may be taken to hold approximately for any batc of rabbits of average sensitiveness.

A Simplified Procedure.

The desirability of using more than six rabbits for a test ha already been indicated. With a view to enabling this to be done by reducing to a minimum the labour involved in taking sample of blood and in estimating the blood-sugars, trials have recentl been made in which the mean value of the blood-sugars for the fiv hours following the injection has been determined directly on

oled sample. It is then only necessary to collect 0.2 c.c. of blood each hour (although it is considered desirable to take all samples duplicate), the five hourly samples for a particular rabbit being livered into the same tube containing 8 c.c. of N $/_{12}$ sulphuric acid. t the end of the experiment, the whole is defecated by the addition 1 c.c. of 10 per cent sodium tungstate. This simplified procedure found to give results agreeing closely with those based on separate c.c. samples taken at the same times.

Using this method, it is quite practicable to conduct a test on) or 12 rabbits and so minimise the error introduced by occasional ratic responses.

Application of the Preceding Method to the Evaluation of the International Standard.

Since the original reference sample could not be employed as a ermanent standard for the control of potency, on account of the mited quantity available, a second sample, purified by Dudley's icrate process, was procured in the form of the dry hydrochloride nd standardised as accurately as possible by comparison with the riginal reference sample. This second sample, which will be eferred to here as the "interim standard", has been kept in the form f a dry powder, over phosphorous pentoxide, and it is with this hat the international standard sample has, in turn, been compared.

Preliminary tests indicated that the interim standard contained pproximately 8 units per mgr., in terms of the original reference ample, and on this basis a series of six cross-over tests was carried ut, comparing a dose of 1 /16 mgr. of the interim standard per kilo vith the customary half-unit dose of the original fluid reference ample. The individual values obtained for the hypoglycæmic ffect of the interim standard, in terms of that of the original eference sample, were 115, 97, 111, 110, 105 and 116 per cent espectively, and their mean 109 per cent. The evidence of these ests is therefore to the effect that the interim standard contains lightly more than 8 units per mgr.; in fact, extrapolation of the igures given in the table on page 68 indicates that an effect-ratio of 109 per cent corresponds to a dosage-ratio of 116 per cent. On this basis, 1 /8 mgr. should be equivalent to 1.16 units, and 1 mgr. to 8 × 1.16 = 9.3 units.

In addition, a convulsion test was carried out using the cross-over principle in the following manner: Equal numbers of rabbits were injected with 1 unit of the original reference sample per kilo and with 0.125 mgr. of the new preparation per kilo respectively, and the number of rabbits which convulsed on each dose was noted. On a subsequent occasion, the test was repeated with reversal of the groups. Out of a total of 52 rabbits, 26 (or 50 per cent) convulsed on the reference standard and 27 (or 54 per cent) on the interim standard. Interpreted in the light of the curve shown in Fig. 1, these figures indicate a unitage of 8.2, but, obviously, no significance can be attached to the first decimal place, since the

difference between 8.0 and 8.2 depends on the occurrence of convu sions in a single rabbit.

In a similar test on half the above doses and using the san rabbits, 9 and 12 rabbits convulsed on the reference and interi standards respectively, indicating a unitage of 9.4. The mea value given by these two tests is therefore 8.8.

It would appear, therefore, that the unitage per mgr. of tl interim standard, in terms of the original fluid sample, was mo nearly 9 than 8; but since the original reference sample was in tl form of a solution which had been kept for some months, and definite information was at that time available as to the stabili of insulin kept in this manner, it was decided to assess the poten of the interim standard at 8 units per c.c. in order to avoid ar possible risk of lowering the unit. This has been the standard reference for the control of insulin potency in this country duri the last two years.

When the international standard material became availab a series of tests was carried out in order to evaluate it in terms of t above-mentioned interim standard. Ten tests of the cross-ov type above described were carried out, comparing the effects equal doses (1/16 mgr. per kilo) of the two preparations. T following values were obtained for the hypoglycæmic effect of t international standard, expressed as a percentage of that of equal weight of the interim standard — 90, 102, 92, 112, 113, 9 94, 95, 97 and 102, the average for the whole series being 99.2 p cent. A similar series of six tests, comparing the effect of eigl tenths of the above dose (*i.e.* 1/20 mgr. per kilo) of the internation standard with that of 1/16 mgr. of the interim standard, gave t following values for the effect-ratio — 85, 93, 92, 89, 75 and 8 with an average of 87 per cent. Reference to the table on page shows that this corresponds to a dosage ratio of 83 per cent. Th is to say, 1/20 mgr. of the international standard is equivalent activity to 83 per cent of 1/16 mgr. of the interim standard, weight for weight, its activity is $\frac{10}{8} \times 83 = 104$ per cent. T convulsion tests were carried out in the manner already describe In one case equal doses of the two standards were injected (1/8 m per kilo). Out of a total of 103 rabbits, 46 convulsed on the inte national standard and 49 on the interim standard. These figu indicate that the potency of the international standard preparati is about 95 per cent of that of the interim standard. In the oth test, on 46 rabbits, 25 convulsed on 1/10 mgr. per kilo of the inte national standard, while 30 convulsed on 1/8 mgr. per kilo of t interim standard. The indication of this test is that 1/10 mgr. the international standard corresponds in activity to 82 per cent 1/8 mgr. of the interim standard, *i.e.* weight for weight, the activi of the international standard is $\frac{10}{8} \times 82 = 102.5$ of that of t interim standard.

Consideration of these results indicates that the two preparatic are very closely equivalent in activity; in fact, the simple avera

f the four independent values, namely, 99.2, 104, 95 and 102.5, appens to be 100.2. Although we cannot arrive at the true verage in this manner, on account of the difficulty in estimating he relative accuracy of the four independent series of tests, any ifference in activity of the two samples is certainly too small to be letected by the methods here employed for its determination. The decision of the Geneva Conference, based on the recommendaion of the Insulin Committee of the University of Toronto, to lefine the unit as the activity of one-eighth of a milligram of the nternational standard preparation, therefore involves no appreiable change in the value of the unit as it has been officially defined n Great Britain for the past two years.

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SCANDINAVIAN COUNTRIES.

PREFATORY NOTE.

The Health Section of the Secretariat of the League of Nations presents herewith the sixth volume of a series of handbooks on the vital statistics of various countries. In so doing it wishes to express its gratitude and thanks for the generous help given by the officials of the Scandinavian countries with whom much consultation and correspondence on the part of the author of the text was necessary.

This handbook was prepared, on the invitation of the Health Section, by Professor Harald Westergaard, of Copenhagen. The Section appreciates the interest and care with which the author has performed his work and wishes to thank him most cordially.

HEALTH SECTION OF THE SECRETARIAT
OF THE LEAGUE OF NATIONS.

OFFICIAL VITAL STATISTICS OF THE SCANDINAVIAN COUNTRIES.

INTRODUCTION.

The need for a ready and reliable source of detailed and descriptive information on the official vital statistics of the various countries has long been keenly felt by statisticians and public health officers. The difficulties which are at once encountered when data from two or more countries are assembled for comparative purposes are familiar to all. When the Health Committee of the League of Nations decided to collect and publish currently data on the prevalence of the chief communicable diseases, important questions arose concerning the comparability of the data. Subsequently, in organising its programme of statistical work, it was planned as a special activity to prepare a series of handbooks describing the official vital statistics of the various countries.

Therefore it is the purpose of these volumes to present a review of the existing practice and procedure in the collection and publication of statistics on population, births, deaths, and notifiable diseases, including not only methods of registration but also the current published reports. Effort has been made to include especially those facts the knowledge of which is important when comparisons are made of statistics from two or more countries. The statistics themselves are discussed chiefly with regard to the form and contents of the official reports on which they are presented.

It is realised that, even when meticulous care is exercised in preparing such handbooks as these, errors may not be entirely avoided, and the ultimate utility of the work can be judged best only by actual experience. Nevertheless, it is confidently hoped that they will prove useful and valuable as reference books on the details of method and procedure in the various national offices which collect and publish vital statistics.

THE EIGHTEENTH CENTURY.

1. At first sight it may seem impossible to give a comprehensive description of the evolution of vital statistics within a territory embracing no less than five different States, but in former days there was a close connection between these countries. *Sweden* was for many centuries united with *Finland*, and the famous system of vital statistics introduced in Sweden in the middle of the eighteenth century was applied in Finland also. *Denmark* and *Norway* were united for centuries, till 1814, and *Iceland* was considered a part of Denmark till its constitution as an independent State in close union with Denmark was formally acknowledged in 1918.

Common to all these States is their free constitution, though outwardly this differs considerably in form, they have much in common. Thus, with regard to confession, the Lutheran Church is prevalent in all the countries.

The area and population, in approximate numbers, of these countries are as follows :

	Area (kilometers)	Population.
Denmark	44,000	3,400,000
Finland	388,000	3,300,000
Iceland	103,000	100,000
Norway	324,000	2,800,000
Sweden	448,000	6,000,000

The area covers about one-eighth of the total European surface, but the total population is only about 15 millions, or 3·4 per cent of the population of Europe. The Danish colony *Greenland*, with about 14,000 inhabitants, is not included in the above table, but the *Faroe Islands*, with about 23,000 inhabitants, are included in the figures relating to Denmark. Having been forced to cede the duchies of Sleswig and Holstein to *Prussia-Austria* in 1864, Denmark recovered part of Sleswig in 1920, this territory being also included in the figures quoted above. *Finland* includes the Aaland Islands. After its separation from Sweden at the beginning of the past century, Finland was for a time united with Russia, till the war made it independent.

The population in the three Scandinavian countries, as well as in Iceland, is uncommonly homogeneous. In Sweden there are only about 7,000 *Lapps* and 30,000 *Finns* ; in Norway only 29,000 belong to these races. Though these elements of the population are not numerous, they are exceedingly interesting for the anthropologist and the student of vital statistics. The same holds good for the *Eskimos* in Greenland. On the whole, the three Scandinavian nations are closely related, the differences of language causing very little difficulty in intercourse and their whole evolution having much in common. The population in Finland is less homogeneous and consists of 11 per cent Swedes and 89 per cent Finns.

2. It will be of interest to follow the evolution of official vital statistics in each of these countries from the beginning. The birth-place of official statistics is *Sweden*,

where after long deliberation a bill for making tabular records of the population was approved by the King and became law on February 3rd, 1748. For many years the Swedish clergy had had the duty of keeping parish registers, containing lists of the members of the congregation, of marriages, births and deaths and of persons moving into or leaving the parish. Incomplete as these lists may have been, they quite naturally became the foundation-stone of the Swedish system of official vital statistics. The mathematician PEHR ELVIUS, Secretary of the Swedish Academy of Science, had undertaken to compile lists of births and deaths for the whole kingdom with the object of determining the probable number of inhabitants. The result was a report (1746) which the Academy sent to Parliament [1], and which probably played a significant part in prevailing on Parliament to pass the above-named Act. As Elvius, like most political arithmeticians of those days, treated his observations somewhat freely, it is not possible to reconstruct his calculations with absolute accuracy, though his method is on the whole clear enough. He regards 70,000 as the normal yearly number of deaths, which he distributes according to age after observations made in certain parts of the kingdom. Following in the main the calculation which HALLEY had used to find the number of inhabitants in *Breslau*, acting on the supposition that the population was stationary, a method later tried in the Netherlands by KERSSEBOOM, he would, for instance, proceed thus : Out of the 70,000 persons who died, about one-third were under three years, and about 29,300 under ten years of age. Supposing, in order to arrive at the same numerical result as Elvius, that 8,000 died between three and ten years of age, and 21,300 under three years, we shall find that 70,000 newly born altogether have passed about 1.5 (70,000 + 48,700) = about 178,000 years before three years of age and 3.5 (48,700 + 40,700) = about 313,000 between three and ten. Altogether, he thus calculates 491,000 years of life, which, on the hypothesis of the stationary population, is the same as the number of persons living under ten years of age. For the following ages he uses decennial averages. The total number of inhabitants of all ages he finds to be 2,097,000, which is not far from the number which some years after was found by direct observation.

Elvius himself did not regard this result as more than a preliminary attempt, and he was himself an advocate of a regular system of official vital statistics, such as was established in 1748. According to this system, rather complicated schedules had to be filled out every year for each parish. Thus there were particulars, for each calendar month, of *baptisms* of legitimate and illegitimate children, with distinction as to sex, *weddings* and number of marriages dissolved by death, the number of *deaths*, separately for each sex, for children under ten years of age, unmarried and married people, with additional remarks on still-births, plural births, etc. Another table gave a classification of *deaths according to age, sex and cause of death.* The children were classified according to age between 0 and 1 year, 1 and 3 years and 3 and 5 years respectively, then followed 17 quinquennial age-groups and, finally, deaths above 90. The nomenclature of the causes of death, 33 in number, would not, of course, satisfy

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[1] The report is reproduced in A. HJELT : *Det svenska tabellverkets uppkomst*... Helsingfors, 1900.

a modern statistician, but it gives much information about that period, notably wit regard to violent deaths and zymotic diseases. The first report, for 1749, shows 1 per cent of the deaths as due to smallpox and measles, six per cent as due to scarl fever, and five to whooping-cough (all of which causes, from 1911 to 1920 inclusiv only caused from one to two per cent of the total deaths). Fourteen per cent die from consumption and lung disease. Several secondary causes of death were note such as dropsy and jaundice.

Finally, there were details with regard to the sex distribution of the *populatio* The inhabitants were further classified according to conjugal condition (childre under 15 years, and single, married, widowers or widows) and according to occupatio and rank, sometimes with particulars as to children under 15 years and young pe sons. In addition, the number of households, of inns and public-houses, etc., wa given. It is interesting to note the average number of persons belonging to eac household, which, compared to modern times, was high (six to seven membe against three to four nowadays).

To a certain extent the magistracy in the towns took part in preparing the lis of the population, but the main work devolved upon the clergy, the study of a past being in fact a small statistical bureau. The clergy complained bitterly and obtaine relief to the extent that the lists of population need only be prepared every thr years. Perhaps not the least trouble, especially in the towns, was caused by th particulars which had to be entered on removal to and from a parish.

3. After the death of PEHR ELVIUS in 1749, " Kanslisecretary " E. CARLESO was given the task of preparing a general summary, with the assistance of some the members of the Academy of Science. The most active of these was the astronom PER WARGENTIN, the successor of Elvius as the Secretary of the Academy of Scienc By a royal rescript of 1756 this committee was made a permanent institution, th Tabular Commission *(Tabellkommissionen)*.

The first report testifies to the importance of the population problem, then burning question in so many countries, not the least in a country like Sweden, whic had suffered severely from the long wars at the beginning of the century. The repo complained very earnestly of the many difficulties which a so thinly populated countr must feel most severely. Many persons were dying yearly whose lives might hav been saved ; there ought to be public access to medicinal drugs ; inoculation again smallpox ought to be tried ; too many children were dying in infancy, being overlai by their mothers ; there were too few midwives, especially in the country, and eve too few physicians ; it was recommended that students of divinity should acqui some knowledge of medicine before they were appointed as clergymen. Furthe there ought to be more inducement to marry. It was a pity that so many thousan were forced to live as beggars (according to the lists there were 29,000 " paupe not in hospital "). A following report (1761) considered in detail the problem *migrations*. In the course of three years 24,000 persons had emigrated; the repor complained of the emigration to Copenhagen, to Norway and to Russia. Late

however, Wargentin acknowledged that the supposed large figures of emigrants were largely due to inaccuracy of the registers.

This report also drew certain conclusions with regard to the causes of *fertility.* Opulence and luxury were considered a hindrance to fertility, the number of conceptions being relatively small in the months when the peasant had the most plentiful supply of provisions.

These reports were not published. As in so many other countries, statistical information was looked upon as a secret of State. In Sweden particularly it was feared that the serious complaints of deficiency of population would give neighbouring States too much information. But by-and-by this silence was abandoned, and several statistical observations were published in the proceedings of the Academy of Science, which was intimately connected with the Commission. Thus, in 1764, there was a report from the Secretary of the Commission, E. F. Runeberg, who gave the number of inhabitants in Sweden and Finland in 1760 (2,360,000), and in 1766 a paper by Wargentin was published with his famous mortality tables for the nine years 1755-63. For the first time, mortality tables based on observations on the living population, as well as on deaths, were published. Wargentin took, for instance, the average number of deaths, 1755-57, in one of the 21 classes of age, comparing that number with the corresponding number of inhabitants registered in 1757 and asking among how many persons would one death occur each year. Having three enumerations, he might have used an interpolation, but the growth of the population was so small that a correction of this kind would have been insignificant, and as a first attempt at finding the mortality of a whole population by direct observation these calculations may be looked upon as sufficiently reliable. It must be remembered that the inaccuracies referred to above were an essential hindrance to calculations of this kind. Wargentin in his later years made an investigation on these lines and found that whereas some of the enumerations were tolerably exact, as, for instance, those of 1751 and 1763, others showed obvious defects.

Wargentin did not follow the investigation further ; thus he did not calculate the expectation of life or the numbers of survivors of a certain generation ; on the whole, he did not enter much into theoretical questions. But at all events he deserves gratitude for what he contributed to vital statistics. As one important result we may refer to the fact that he for the first time proved that the rate of mortality of the female sex in a general population was smaller than that of males.

4. It may be worth while to consider for a moment some of the outstanding features of the vital statistics in Sweden in the middle of the eighteenth century as compared with recent observations [1].

Within the boundaries of Sweden (without Finland) there was a population of about 1.8 millions as compared with six millions to-day. The first striking feature is the relatively small number of males. For each 1,000 males there were in 1750 no

[1] Besides official statistical reports we may here quote : G. Sundbärg : *Bevölkerungsstatistik Schwedens*, 1750-1900, Stockholm, 1907.

less than 1,127 females, as against 1,037 in 1920. It is difficult to offer an altogether satisfactory explanation for this. There were differences with regard to mortality; migrations may have influenced the numbers, and the continuous wars at the beginning of the century may have accounted for the small number of aged males. The disparity of the sexes influenced the distribution of the population according to conjugal condition. In 1750, of 100 adult males, 60 were married, of adult females only 50. The latter proportion held good at the beginning of this century, whereas for males the rate had been reduced to about 55.

As to age distribution, we find proportionally fewer children under five years nowadays than in 1750, the proportion being about 10 to 13, and in advanced years we quite naturally find the opposite features; in the middle of life the differences are less striking.

The rates of marriages were decidedly higher in the eighteenth century than they are to-day. In 1751-60 the yearly rate of marriage was nine per thousand of the population against six per thousand in 1911-20. This may to some extent account for the reduction of the birth rates which is so pronounced in our days (from 34 per thousand in 1751-1800 to 21 per thousand in 1916-20), though, on the other hand, illegitimate births were less frequent formerly. In Sweden this reduction of fertility belongs essentially to the twentieth century. Data concerning the legitimate fertility at various ages of married women are available from the last decenniums of the eighteenth century. The rates for 1781-90 were not very different from those of 1891-1900, but at the beginning of the twentieth century a continuous decrease set in.

The following table gives a general idea of the movement of the yearly number of marriages, live births and deaths per 10,000 inhabitants:

	Marriages	Births	Deaths	Surplus of births over deaths	Actual rate of increase
1751-1760	90	357	273	84	78
1761-1770	85	342	276	66	59
1771-1780	85	330	289	41	37
1781-1790	79	319	279	40	32
1791-1800	86	333	253	80	70
1801-1810	83	308	282	26	20
1811-1820	87	333	258	75	76
1821-1830	83	346	236	110	110
1831-1840	71	315	228	87	83
1841-1850	73	311	206	105	104
1851-1860	76	328	217	111	104
1861-1870	65	314	202	112	76
1871-1880	68	305	183	122	91
1881-1890	63	290	169	121	47
1891-1900	59	271	163	108	71
1901-1910	60	258	149	109	73
1911-1920	63	221	143	78	67

The *illegitimate* births were in 1751-60 only two to three per cent of the total number ; a century later nine per cent ; 1911-20, 15 per cent.

The above table shows the well-known movement of *mortality rates*. It was very high in the eighteenth century, though it left a considerable excess of births over deaths, so that the population during 1751-1800 had a natural increase of about 640,000, most of them remaining in the country. The rate of mortality varied much from year to year. Thus in the famine year 1772 there was an excess of deaths over births, and in 1773 the rate of mortality rose to 52 per thousand. The rates were also high in 1808-9, but on the whole the mortality rate steadily declined, and as the birth rate for a long time was proportionately high the result, as in many other European countries, was a considerable *natural increase* ; in 1801-50, eight per thousand yearly ; in 1851-1900, 11.5. In the latter period, *emigration* became an important social factor, taking about one-third of the natural increase, and this proportion remained till the Great War reduced emigration to a minimum. In 1922-23 emigration again became a conspicuous social factor.

Infant mortality has been strikingly reduced. Out of 10,000 children born alive, the following number died in the first year of life :

1751–1760	2,046	1851–1860	1,460	1911–1915	723
1801–1810	1,987	1901–1910	845	1916–1920	662

These figures signify an enormous saving of life as the result of modern economic and hygienic progress.

At other ages of life a considerable reduction of mortality is also observed. This will appear from the following table showing the number of deaths among 1,000 persons at each age group :

Years	1751-60	1801-10	1851-60	1901-10	1911-15	1916-19
0– 5	84	79	60	28	22	22
5–10	13	12	11	4	3	4
10–15	6	7	6	3	3	3
15–20	6	7	5	5	4	6
20–25	8	10	7	6	6	9
25–30	9	10	8	6	6	9
30–35	12	12	9	6	6	8
35–40	11	14	11	7	6	8
40–45	16	16	13	8	7	8
45–50	17	19	16	9	9	9
50–55	22	26	20	11	11	11
55–60	27	34	27	15	15	15
60–65	38	49	38	22	22	21
65–70	50	66	56	33	33	33
70–75	83	103	86	53	54	54
75–80	120	156	129	88	88	87
80	208	263	211	175	182	178

The rates of 1801-10 testify to the hardships of 1808-9. We also observe a
remarkable increase in the death rates in 1916-19 owing to the severe influenza
epidemic of 1918, which raised the mortality of young adults to the level of th
eighteenth century. But, on the whole, the progress is evident. This will also be clea
on inspection of the figures indicating the *expectation of life* at various epochs. Thi
was calculated for 1816-40 and gave, for both sexes combined, at birth, an expecta
tion of about 41 years. In 1911-15 the corresponding figure was 58 years, or an addi
tion of seventeen years.

At present, Sweden may rightly claim to be one of the healthiest countries in th
world. But in spite of the poverty of the population, and notwithstanding the com
plaints of the economists of the time, this also seems to have been the case in th
eighteenth century. That the death rates were higher in an urban population lik
Breslau's, as shown in Halley's famous table two generations before, was not surpris
ing, but, comparing the rates of mortality with those in the *Netherlands* fo
annuitants, and in *France* for members of tontines, for the most part probabl
well-to-do people with relatively good health, we arrive at the result that the publi
health in Sweden was comparatively good. Indeed, Kersseboom's table for th
Netherlands shows a somewhat higher mortality, whereas Deparcieux's tabl
corresponds pretty well with the Swedish. The Danish clergy reported les
favourable mortality rates than their Swedish colleagues [1]. If we compar
Quetelet's table for Belgium ninety years later (1841-50), we find, betwee
10 and 30 years of age, somewhat more favourable mortality rates in Sweden
whereas at higher ages the rates are approximately equal.

5. After this digression we may return to the progress of Swedish *official statis
tics*. As observed above, Sweden, many years before other countries, possessed i
1756 a permanent official institution *(Tabellkommissionen)*, which was, however
but poorly equipped financially. The members received no honoraria; the secretar
alone had a moderate yearly stipend. Still, the Commission worked with great zea
till its moving spirit, Wargentin, grew ill and, after a protracted illness, died i
1783. For several years after his death the Commission seems to have been inactive, til
it was reconstructed in 1790 and the astronomer H. Nicander was appointed secre
tary. The work had been simplified in 1773 as the lists of the population were onl
sent in every five years and only for each diocese, not for the provinces. Later, i
1792, an important reform was made, lists for the deaneries being thereafter sen
directly to the Commission. Suitable arrangements enabled the Commission t
compile figures for each province through separate lists for parishes situated i
more than one province. At the close of the century, a more liberal grant was allotte
to the Commission so that it could more easily discharge its increased duties.

After 1775 the records contain particulars concerning the age of *mothers bearin
children*, in five-year age groups. In this respect also Swedish statistics were man

[1] Linders: *Demografiska Studier rörande Svenska Kyrkans Prästerskap I*, Uppsala, 1925.

years in advance of those of other countries, providing students of the question of the history of fertility with most valuable material. Subsequently, many essential improvements were made. In accordance with the new schedules prepared in 1802, the statistics of *marriages* were much improved, particulars as to marriages of single persons, widowed, etc., being recorded ; from 1821 a classification of marriages according to first, second and later marriages was made. Further, the reports contained the numbers of *immigrants and emigrants*. From 1804 the number of *persons vaccinated* was recorded, at that period a most important subject, the introduction of vaccination being probably one of the causes of the considerable decrease of mortality. From 1805 onward data concerning the population were collected for each commune separately, and also other valuable information was obtained, for example, with regard to *households* and to the number of *Laplanders*.

The Swedish *Tabellkommission* may thus justly claim a high place in the history of vital statistics, and as we shall see below the same can be said of the *Central Bureau of Statistics* which in 1858 replaced the Commission.

6. In *Denmark* and *Norway* the conditions of vital statistics were much less favourable, though enumerations of the population were made. Thus in Denmark there was a census in 1769 and another in 1787 ; in Norway there was also a census in 1769, and as early as 1662 a census of males above 12 years of age had been taken for military purposes. In *Iceland* a census was taken in 1703 and another in 1769, but there was no organisation to work out the results.

There were essential defects in the Danish census. That of 1769 was taken chiefly in order to ascertain the number of taxpayers, and consequently the enumeration could not be very exact. Moreover, enlisted military persons were excluded. Of much higher value was the Danish census of 1787, and the results are of very great interest to students of the social and economic history of Denmark ; the details were not accessible to the public. In contrast with the census of 1769, the schedules in 1787 contained the names of all enumerated persons, their ages and conjugal conditions, occupations and a rather intricate statement as to the position of each member of the family, whether the children were legitimate or not, and whether they were the offspring of a first, second or later marriage. The enumeration in the towns was taken by the magistrates, whereas in the country the pastor had to work out the lists by personal examination of the head of each family in the parish. As in Sweden, the clergy had to send in lists of births, deaths and marriages. These lists were introduced in the middle of the seventeenth century, but it was not till 1735 that the reports of the clergy to the bishops in Norway and Denmark were placed on a regular basis. From the bishops a report for each diocese had to be sent regularly to the Government. In 1775 the schedules for births, deaths and marriages were given a definite form ; among other things, the lists had to give the distribution of the newly born as to sex and numbers of illegitimate births (without sex distribution). In 1800 still-births were added. The schedules of 1775 contained mortality returns for each ten-year age group.

Denmark and Norway, as well as Iceland, had thus made some progress in vita
statistics, though these countries were far behind Sweden and Finland in this respect
There was in Denmark no committee appointed to prepare the census reports the work was left to private persons. Thus in 1787, an economist, VON EGGERS, wh evidently devoted much care to the task, distributed the population according t age and sex, using ten-year age groups : the population was divided into severa classes (10 in the towns, 16 in the country), which again were subdivided accordin to age, sex and conjugal condition. These carefully arranged tables, which are pre served in the statistical department [1], give a most characteristic picture of the socia structure of the population. They enable us to follow the life of an artisan fron apprentice and journeyman to master, the artisan seldom marrying before he coul settle as master, often at an advanced age. In the country there were the variou classes of peasants (farmers, cottars and labourers), and here also it is interesting t note the movements from one class to another, the young persons working as servant till they in their turn could settle in married life. The evolution of the followin century entirely altered this primitive structure of society, both in urban an rural populations, though certain features still remain. It would not be easy nowaday to give such a detailed idea of the distribution of the population as was containe in those tables which VON EGGERS, with a few assistants, finished in the course o three years. Some supplementary tables were finished in 1798. Unfortunately these valuable tables, as observed above, were not published, but a few results wer made known to the public.

A permanent statistical institution, as in Sweden, was established in 1797 fo Denmark and Norway, a "Tabelkontor" under the Ministry of Finance. This insti tution, however, possessed very little influence. Its chief duty was to collect an revise accounts concerning taxes and other sources of public revenue, and vita statistics had only a secondary place in its activities. In 1801 a census was take and the office was charged with the duty of making reports on it. It had, however so little time left after the revision of accounts that year after year went by ; in th course of time some preliminary results were published, but the final report fo Denmark was not finished till 1834, in which year a new census was taken.

7. As the statistical observations regarding the movement of the populatio in the eighteenth century in Norway and Denmark were far less complete than in Sweden, it is not possible to give an exact picture of the chances-of-death in th two former countries in those days. The number of births and deaths was only summary, and it is not quite clear whether still-births were included or not ; they appear to have been included in the deaths in one period but not in the births. As there is no age distribution of deaths, a mortality table cannot be calculated, as was possible in the case of Sweden ; we may, however, draw some conclusions

[1] Reproduced in *Statistisk Tabelværk 5 A 5 : Befolkningsforholdene i Danmark i det 19. Aarhun- rede.* Copenhagen, 1905.

indirectly by a calculation of expected deaths on the basis of one of the modern mortality tables. Choosing the mortality experience of 1916-20 for Denmark, we find that about 10,400 deaths might have been expected in 1787, whereas the recorded number during 1785-89 averaged 24,760. The actual number of deaths was thus 2.4 times higher. The uncertainty with regard to still-births in this connection is evidently quite unimportant. It may be remarked that we arrive at nearly the same result by using the crude death rates. For 1785-89 the crude death rate was about 30 against 13 in 1916-20, or 2.3 times higher. Thus reasonably accurate results can be obtained from a study of the old crude data. The rates of mortality in Sweden at the same time were only slightly more favourable.

In 1785-89 the crude birth rate in Denmark was 31, thus providing a small surplus over the deaths. The rate of marriage was, as in Sweden, comparatively high, namely, 8.5. The total excess of reported births over reported deaths in the last quarter of the century was 77,000, a figure which is in rather close agreement with the actual growth of the population.

As to *Norway*, similar conclusions can be drawn from the material at hand. The following figures give the main features of the movement of the population in the eighteenth century. The lists of births and deaths are nearly complete, though, of course, there are sources of error. The census of August 15th, 1769, gave 724,000 inhabitants, to which must be added about 4,000 soldiers, whereas in 1801 (February 1st) the population was 883,000. Even if the military force be taken into consideration, there was, as in Sweden, a considerable excess of females (in 1769 about 110 females for each 100 males). The distribution according to age was somewhat different from the present one, there being proportionately few people in the high age groups, and relatively many children.

For each 10,000 inhabitants there were :

	Live births	Deaths
1735–1739	299	263
1740–1749	302	308
1750–1759	339	246
1760–1769	347	275
1770–1779	300	260
1780–1789	303	255
1790–1799	329	223

The birth rates were thus high compared with modern rates. The mortality rate was very variable. Thus in 1742 it rose to seven per cent; during the famine of 1773 it was five per cent. On the whole, the death rate frequently exceeded the birth rate.

If we try to use the Norwegian table of mortality for 1911-20 on the population of Norway in 1769, which was distributed according to eight-year age groups till

the age 48, we find an expected number of deaths of about 8,400 against some 20,00 the actual figure. There is thus very much the same difference between expecte and actual mortality as in Denmark, and by using the crude death rates we arrive roughly speaking, at a similar proportion. The total excess of births over death during 1735-99 was about 300,000, who for the greater part remained in the country

Though the mortality in Norway in those days was excessively high compare with present rates, it does not seem to have been more unfavourable than in th neighbouring country, Sweden. If the expected deaths in Norway be calculate on the Swedish table, we obtain a total figure not very different from the observe one.

It would seem that the marriage rate was rather high, but subject to marke fluctuations, which account for part of the variation in the number of births. Th proportion of illegitimate children born was in those days not very large, about fiv der cent against seven per cent nowadays.

SWEDEN.

1. In the Scandinavian countries, as in most parts of the civilised world, the organisation of official statistics made great progress during the nineteenth century, especially as regards vital statistics.

In *Sweden* an important step forward was taken in the middle of the century [1]. Different branches of official statistics had been taken up by various Government departments, and it was felt desirable to systematise their efforts. A committee was therefore appointed in 1850 which, after several years of deliberation, issued a report with a detailed plan for the future organisation of official statistics. It might have been expected that the report would have proposed the *centralisation* of statistics, but this was not the case ; in fact, the committee recommended a continuation of the system of decentralisation which had gradually evolved, though an advisory commission was added in order to secure some cohesion between the various branches. It was proposed to establish a Central Bureau of Statistics, which should take care of vital statistics and various other subjects. In the main, this plan was adopted in 1858, and thus the foundation-stone was laid for the existing organisation.

The new organisation preserved to a great extent the old system of vital statistics based on reports from the clergy, in the form of extracts from the parish registers, not only concerning marriages, births, deaths and migrations, but also as regards the enumeration of the population every tenth year. A system of this kind quite naturally led to certain principles with regard to the enumeration of the population. In most countries, when a direct census is taken, the task is generally to determine the population which *de facto* is living in any given place at a given moment, even though the persons enumerated may have their regular domicile in another place. In Sweden the enumeration aims at finding the population which *de jure* belongs to the parish, and which is to be found in the parish registers, even if the persons concerned are living elsewhere within the kingdom or abroad. The difference is however, relatively small, at least as regards the results for a province or for the kingdom as a whole. Out of a population of about six million persons at the end of the year 1920, only 35,000 were registered as absent from the place of registration : namely, 19,000 within the kingdom, 5,000 abroad, and 11,000 on the sea or without sufficient address.

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[1] E. Arosenius : *The History and Organisation of Swedish Official Statistics.* The History of Statistics collected and edited by John Koren. New York, 1918.

In some respects this system has its advantages. Thus, when calculating rat of *mortality* for a municipality where there is a hospital frequented by the surroundi population, it is often difficult to single out deaths of persons coming from outsid so that consequently the rates of mortality may be overstated. In Sweden it comparatively easy to avoid this source of error, and the problem of getting reliab observations concerning the difference between the health of the rural and t urban population respectively was solved many years ago as far as Sweden concerned.

The Swedish system is also of use when the problem of *migrations* within a count has to be considered. Hitherto, in most countries this problem has generally be studied only indirectly, whereas in Sweden direct observations are available. Th subject may occupy a prominent place in future vital statistics and observatio such as those of Sweden will then be very useful.

2. As observed above, the Swedish *clergy* have to furnish the Bureau Statistics with material for the study of the yearly movements of the populati and every tenth year to give a *nominal roll* of the individuals registered in t parish. The clergy have occasionally complained bitterly of the burden which h thus been laid on their shoulders, and in a populous parish it undoubtedly giv the pastor much clerical work. But the system has a tradition of nearly two centuri and Swedish statisticians will generally recommend it as sufficiently reliable, least for rural districts. In larger towns there may be some difficulty in getti exact figures, and, as far as *Stockholm* is concerned, the system has been altered, being the duty of the "rotemen", municipal officers who control the lists of t payers *(Mantal)*, to furnish the Central Bureau of Statistics with material for t decennial enumeration of the population, based on these lists.

All over the country a person who leaves the place where he is registered h to announce the fact and be registered in the place of arrival.

The pastor keeps a register of all his parishioners (a *församlingsbok*), out which he sends every tenth year a nominal roll for the use of the Central Stati tical Office. Further, there is a register in which marriages are entered, one for birt and baptisms, another one for deaths and, lastly, a register of persons about who there is no reliable information — for example, persons who have left the parish witho notice. This register of "obefintliga" (persons who cannot be found) plays an impo tant part in the system. From the parish register the name of any person who h left the kingdom without announcing it, or who has taken residence somewhe else in the kingdom, his address being unknown, has to be transferred to the regist of "obefintliga". Such persons are not included in the enumerations of the pop lation. If later on it is known that the person in question is dead, his name will registered in the book of deaths ; if it is notified that he is living in some publ institution (hospital, prison, etc.), or if he gets a certificate as having settled another parish, his name will be transferred to that parish register. In order t secure greater accuracy, new prescriptions were laid down in 1915 ; these have ha

great influence. Formerly, there was a risk that a person might obtain a certificate removal from the parish without leaving; his name was then cancelled in the rish register without being re-registered in another parish. Now his name will main in the parish register until the pastor is notified that be has been registered his new place of residence.

Every year the pastor has to make a statement of the population of his parish, ter having taken all changes into consideration. He states — for each sex sepately — the number of inhabitants at the close of the preceding year. To this he ds the number of children born during the year, and of persons who have come om other parishes within the kingdom, or from abroad, as well as of persons who ve been transferred from the register of "obefintliga". From the total he subtracts e number of persons who have died or migrated from the parish or who have had be registered in the register of "obefintliga". Thus the population of the parish enumerated. There is a separate distribution of the population according to the unicipalities to which it belongs, and finally the pastor has to make out a nominal ll of persons from abroad who have settled in the parish in the course of the year who have been transferred from the register of "obefintliga", as well as of persons no have left the parish for abroad or whose names have had to be transferred to e "obefintliga" register. For each of these persons, particulars as to the year of th, occupation, conjugal condition and the country from which, or to which, he s migrated have to be entered. In the decennial registration, as we have seen, e "obefintliga" are ignored: much uncertainty is avoided in this way. Thus in e number of "obefintliga" an uncommonly large number of persons above 100 ars of age is found, many of whom are probably dead without this fact being own.

3. As the whole population is regularly enumerated once a year in the lists of *xpayers*, there is a good opportunity of revising the parish register. This is all e easier because the pastor, or a person delegated by him, has to be present when e lists of "mantal" are made out. These lists are then compared with the parish gister so that they can be reciprocally controlled and revised. When the decennial umeration is taking place, the schemes for the "mantal" are particularly tailed.

As remarked above, the "mantal" in *Stockholm* is the basis of the enumeration. is arrangement was made in 1905. The difference between the number of inhabits according to the "mantal" and to the parish books respectively is small. In ockholm, with its 400,000 inhabitants, the difference in 1920 was only 348. In e two larger cities, Gothenburg and Malmö, a municipal officer takes care of the nantal", but, the parochial lists being very reliable, the decennial enumerations e based on them. A reorganisation has just been made in Stockholm with a view centralising the various offices in one institution.

For the whole kingdom, the following numbers at the close of 1920 were und:

Population, December 31st, 1910	5,522,403	
Live births, 1911-1920	1,262,935	
Immigrated	75,554	
Transferred from " obefintliga " register	31,341	
		6,892,23
Deaths	816,489	
Emigrated	118,375	
Transferred to " obefintliga " register	82,851	
		1,017,71
So that the population on December 31st, 1920, should be		5,874,51
The enumeration gave, however		5,904,48

or a difference of 29,971. At least 11,000 of this difference is explained by the refor of 1915 referred to above.

If the parish books had been kept with absolute accuracy all over the kingdo the difference should, of course, have been zero. There may have been some mistak concerning immigrants, or persons in the " obefintliga " register may have bee entered twice. On the whole, the difference is probably more often due to mistak in the registers kept by the pastors than to mistakes in the decennial enumeratio It is believed that the difference will be much smaller when the prescriptions of 191 will have been operative for a whole decennial period (at the census enumeratio December 31st, 1930). It must be acknowledged that the present difference small, being about 0.5 per cent.

The enumeration at the close of the year 1920 gives very detailed particulars full name, position within the family, profession, nationality, year of birth and birt place, confession, etc., and the year of marriage for married couples. Absente are specially named, as are persons who are blind, deaf and dumb, idiots, lunati or epileptics. The " mantal " is likewise very complete. It may be added that t Municipal Statistical Office of Stockholm publishes the distribution of the populatio in the capital at the close of each year, according to sex and year of birth, based o the "mantal". Some difficulty may be met with regard to the number of *households*, t statistics on this subject being perhaps more reliable when a special census is take

4. Statistics of the *movements* of the population are mainly dependent upon t reports from the *clergy*. The lists of *married* couples are very detailed, giving part culars with regard to age, occupation, confession, etc. : bachelors, widowers, divorce persons, etc., are all classified. A supplement which presents peculiar interest contai statistical information concerning *separations* and *divorces*, given by the courts and t *Ministry of Justice*. Such data are available for all years since 1831 and indicate remarkable increase, especially in the twentieth century. With regard to the divorce particulars are given concerning ages, duration of marriage and number of childre

The lists concerning *births* are also very detailed. Mention is made of the da of birth, still-births, name, age, nationality, confession and address of parents, the

onjugal condition, and date of marriage. Statistics of still-birth have been available :om the very beginning of the " Tabellvärk ", but not till 1831 were there any details oncerning legitimate and illegitimate still-born children. As remarked in the pre-eding chapter, the relative frequency of births out of wedlock presents a striking ontrast when compared with that of the eighteenth century, there being in 1751-60 nly two per cent illegitimate children among the live-births, whereas the proportion 1 1916-20 was 15 per cent. The lists contain most interesting statistical information oncerning the time elapsed between marriage and the birth of a child (more than ne-third of the weddings in 1911-15 took place after the conception of a child) and lso with regard to the birth-rate at various ages of the mothers (such figures are vailable from 1871 and subsequent years for births out of wedlock), thus providing xcellent material for the study of the decrease of fertility.

Mortality statistics have been treated with particular care ever since the Swedish ystem was introduced in the middle of the eighteenth century. Once again the arish lists are the foundation-stone. Here, too, there are nominal rolls, with parti-ulars concerning age, conjugal condition, occupation, the day and year of birth, he cause of death as given by the doctors and by the pastor and, finally, the place 'here the death occurred, whether in the parish or outside ; the last item is, of course, f great importance where exact rates of mortality have to be calculated.

5. As to the *causes of death,* it was the duty of the clergy from 1751 till 1830 to upply such information as was available. Of course, such data could not be very xact, and the clergy complained of this part of their duty, which they could only arry out very imperfectly. A change in the procedure was made in 1831. Since that ear the clergy have had to inscribe the cause of death only in case of epidemics, death 1 child-bed, suicide and other violent deaths. These prescriptions were for the most art repeated in 1857. In the country, and in towns where no public medical officer as been appointed, the clergyman had to state the cause of death if due to epidemic isease, death in child-bed, so-called endemic diseases (viz., diseases peculiar to the lace) or violence. Otherwise, it was left to the discretion of the pastor to state what e knew concerning the cause of death or to leave the question unanswered. In all owns where medical officers were to be found, the cause of death had to be inserted 1 the registers in accordance with a certificate of death from a doctor or (in the case f child-birth and newly born children) from an authorised midwife. It was incumbent pon every practising medical man to forward a communication concerning the ause of death of all persons whom he had treated. The Central Health Office *(Sund-edskollegium)* elaborated the necessary schedules and a nomenclature with a view o secure uniformity all over the kingdom. Later on these prescriptions were revised ; n 1891 an addition was made concerning deaths when no medical man had been in ttendance on the deceased. Since this date the cause is stated in practically all ases of death occurring in the urban population.

In rural districts the statistics of causes of death were very incomplete. The " Tabellkommission ", and later on the Central Office of Statistics, succeeded in

working out more or less complete statistics with regard to deaths in child-bed, violent deaths, epidemics and deaths from abuse of intoxicating liquors for the years 1831-1910, but such information embraced only one-tenth of the total number of deaths. Other particulars concerning causes of death could only exceptionally be of much assistance, for example, in an attempt to obtain information concerning the frequency of death from tuberculosis. In 1910 the prescriptions relating to towns were extended to all places where there were public medical officers. In all other places the pastor has to insert in his register the cause of death as given by the physician who treated the deceased. If no doctor has seen the deceased during his last illness, then the name of the doctor, if any, whom he had consulted in the last year of life has to be stated. Every month the pastor has to send to the provincial medical officer a list of deaths that have taken place in the parish. The latter has to review the real or surmised causes of death ; if proved, the letter B is added against the entry; if surmised, the letter S. The material concerning the causes of death has to be forwarded to the Central Office of Statistics. As observed above, the statistical treatment of these data can refer each death to the place where the deceased person lived, so that the rates of mortality can be correct even if an urban hospital be abundantly frequented by the surrounding population.

It may be difficult to draw quite safe conclusions from the data for different epochs as to the rates of mortality from various causes of death. Still there is reason to believe that the energetic efforts to fight *tuberculosis* have contributed to the constant decrease of the general rates of mortality; the statistical material points decidedly in this direction. The mortality from tuberculosis per 10,000 inhabitants was 19 in the year 1911, against 15 in 1922. Less successful has been the campaign against *cancer* which a Swedish league has taken up. *Leprosy* is at present a very rare disease in Sweden, an enumeration in 1924 showing only 33 lepers in the whole kingdom.

In the City of *Stockholm*, which has its own statistical office, the treatment of the data is particularly careful. If a death be ascribed to more than one cause, an investigation is made in order to ascertain the main cause, generally in consultation with the doctor who treated the case. As to violent deaths, great care is taken to discriminate between suicides and accidents.

Valuable material concerning the frequency of certain *diseases* is collected by the Health Department *(Medicinalstyrelsen)*. All practising doctors have to notify cases of certain epidemic diseases which they have treated (smallpox, scarlet fever, diphtheria, typhoid fever, polyomyelitis acuta, etc.). In other cases, this duty rests on officially appointed physicians (puerperal fever, measles, whooping-cough and influenza).

With regard to *venereal* diseases, recent legislation has facilitated the fight against this peril (especially an Act of 1918). Free medical treatment and energetic efforts to find the source of infection have undoubtedly contributed much to the considerable decrease of the frequency of those diseases. Twice a month, reports on these diseases are sent by physicians in all parts of the kingdom to the Health Department.

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Annex.

SWEDEN.

Form A.

Extract from the Record of Births and Baptisms in 19...... for the Parish of .... in the Deanery of........... Diocese of........... County of ....

The extract includes...... sheets. The last serial number in the Record of Births and Marriages for the year preceding the above year is ......

1	2	3	4	5	6	7	8	9	10	11	12	13	14	21
Serial number of record	Date of birth		Classified in the parish as				Christian name	PARENTS		MOTHER				Observations, *e.g.*, the place of confinement (if outside the parish), certificates received and sent, etc.
	Year and month	Day	Live birth		Still-birth			Name, occupation, nationality and religion (if foreign), address, date of marriage	Date of birth, year, day, and month	Married	Widowed or divorced	Betrothed	Unmarried	
			M.	F.	M.	F.								
								Father: Mother: m. /						
								Father: Mother: m. /						
								Father: Mother: m. /						
								Father: Mother: m. /						
								Father: Mother: m. /						
								Father: Mother: m. /						
								Father: Mother: m. /						
								Father: Mother: m. /						
								Father: Mother: m. /						
								Father: Mother: m. /						
								Father: Mother: m. /						
								Father: Mother: m. /						

SWEDEN. Form B.

Extract from the Record of Banns and Marriages in 19 . , for the Parish of ...., in the Deanery of ...., Diocese of ...., County of ....

The extract includes......... sheets. The last serial number in the Record of Banns and Marriages for the year preceding the above year is.........

1	3	4	5	7	8	9	10	11	12	13
Serial number of Record.	Christian name and surname, occupation, address, nationality and religion (if foreign), and, in cases of remarriage, civil condition (widower, widow, divorced).	Date of birth.		Notes on dispensation as regards age (other notes in col. 7 of the Record are not included in this extract).	Civil marriage, optional or compulsory.	Date of marriage.		Number of previous marriages.	Person officiating at marriage.	Observations, *e.g.*, certificates sent or received, agreements on religious education of children, reference to the Record of Banns for a previous year or the Record of Marriages for a later year, etc.
		Year.	Day and month.			Month.	Day.			
	{ M. W.									
	{ M. W.									
	{ M. W.									
	{ M. W.									
	{ M. W.									
	{ M. W.									
	{ M. W.									
	{ M. W.									
	{ M. W.									
	{ M. W.									

SWEDEN. Form C.

Extract from the Record of Deaths and Burials in 19...., for the Parish of ...., in the Deanery of ...., Diocese of ...., County of ....

The last serial number in the Record of Deaths and Burials for the year preceding the above year is .... (To be filled in only in the extract for the second half of the year.)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	16		17	18	19	22	
Serial number of record	Date of death		Classified in the parish as		Christian name and surname, occupation, nationality and religion (if foreign), address, and the name, occupation and address of the husband (for a wife) and of the parents (for minors).	Date of birth		Unmarried		Married		Widower or divorced	Widow or divorced	Cause of death		Death Certificate by		Place of death (if other than the place of residence)	Year of birth of widow or widower	Observations, *e.g.*, certificates sent or received, decision of a court upon the declaration of death, place of burial (if outside the parish), if corpse missing, cremation, name of doctor last consulted by the deceased, etc.
	Year and month	Day	M.	F.		Year	Day and month	M.	F.	M.	F.			Clergyman's note	Doctor's note	Doctor	Midwife			

SWEDEN.

Form D.

Summary return of the Population in 19.... in the { Parish / Parish register-district } of ....

in the Deanery of .... County of ....

Line.					Male.	Female.	Total.
1	The population, which at the end of preceding year was						
2	*increased* during 19.... by: births						
3	persons coming from other parishes of the country . . .						
4	immigrants						
5	transferred from the record of persons of unknown address						
6	Total . . .						
	but *decreased* during that year by :	Male.	Female.	Total.			
7	deaths						
8	persons leaving for other parishes in the country						
9	emigrants						
10	transferred to the record of persons of unknown address						
11	The population at the end of the return year was thus.						

Line.	Communes and market-town to which population belonged:	Male.	Female.	Total.	Line.	Circuits (assize-divisions) and rural districts to which population belonged	Male.	Female.	Total.
12	The commune of				16	The circuit assize-division of. .			
13	» » »				17	» »			
14	Total (= line 11)				18	Total (= line 11)			
15	The market-town of				19	The rural district of			

....

....

Date .... 19........... ....

Vicar, Deputy-Vicar, Curate.

List of immigrants, who during the year settled in the parish and of persons transferred from the Record of people of unknown address to the Record of immigrants.

(Every person, once removed in due form from the register as an emigrant, but afterwards having returned to this country, has to be classified as an immigrant. This applies also to persons removed from the register as emigrants, if their emigration did not take place and they were therefore re-registered in a Swedish parish.)

Unmarried.		Married.		Widower or divorced	Widow or divorced	NAME [To be filled in for each immigrant or person transferred from the Record of persons of unknown address (also minors)].	OCCUPATION (For sons and daughters at home the parents' occupation to be stated in brackets).	Date of birth.	Country from which the immigration took place. (In case of persons with unknown address transferred to the Record of immigrants, the col. has to be filled in with "Record of persons of unknown address.")
M.	F.	M.	F.						

Form D *(continued)*.

List of emigrants during the year and of persons transferred to the Record of people of unknown address.

Unmarried.		Married.		Widower or divorced.	Widow or divorced.	NAME [To be filled in for each emigrant or person transferred to the Record of people of unknown address (also minors)].	OCCUPATION (For sons and daughters at home the parents' occupation to be stated in brackets).	Date of birth.	Country stated as place of emigration. (In case of persons transferred to the Record of people of unknown address, the col. has to be filled in with "Record of people of unknown address.")
M.	F.	M.	F.						

Page ....

Extract from the Parish Record December 31st, 19 ..., for the Parish of ...., in the Deanery of ...., County of ...., December 31st, 1920

	1	2	3	5	7—8									12	17
Household	*Village* or holding (quarter or ward in towns) (The name of the village to be written on a separate line and underlined) *Name* (and surname) of every person; *relationship* (w=wife, s=son, d=daughter, etc.); *title* (if other than that given in col. 2); *not baptized*; *not baptized in the Swedish church.*	*Occupation* *Race* (foreign) *Infirmity* (insane, imbecile, blind, deaf and dumb, epileptic)	Birth		Date of marriage	Unmarried		Married		Widower	Widow	Divorced		Received Holy Communion in the Swedish church	*Confession* (foreign) *Nationality* (foreign) *Absent*
			Year of birth	*Place of birth* (parish in country or in town)		M.	F.	M.	F.			M.	F.		

SWEDEN.

Form F.

DATA FOR REGISTRATION IN 1921

(For the country) County : .... {Parish / Market-town} : .... {Village: farm, homestead and number / Other estate; holding} : .... Address : ....

(For towns) Town : .... Parish : .... Ward and ward number : .... Street and street number : ....

Read carefully the instructions on both sides of the form.

Principal occupation [1]	Position in the occupation [1]	Subsidiary occupation	NAME (Full christian and surname. Married, divorced and widowed women state their husband's surname and their maiden name)	Date of birth		Birth place (parish and country)	Civil condition [2]	Residence at the preceding registration [3]	Observations, *e.g.*, name of employer, nationality, etc.
				Year	Month and day				

Two copies of the form to be filled in for each household.

[1] If there is only one occupation, this occupation should be given. The occupation ought, if possible, to be given for each man or woman over 15 years of age as well as for the wife and other members of the family, if they pursue a separate occupation. Persons who are temporarily out of work, should state the occupation last carried on. Persons no longer occupied ought to state their former occupation preceded by the word *late*. Persons, who are not and have not been occupied, should make this clear by describing themselves as, *e.g.*, son at home, daughter at home. A widow not herself engaged in an occupation should give the occupation of her deceased husband, *e.g.*, by describing herself as shopkeeper's [illegible]

taking should state in the first column ("Principal occupation") the nature of the occupation or undertaking (*e.g.*, bakery, brick-works, machine-shop, etc.) and in the second column ("Position in the occupation") the nature of their post which may conveniently be shown by an abbreviation, *e.g.*, e = employer, w. = worker, o. m. = own master, *i.e.*, a person pursuing an occupation without any other help than that of his family, overs. = overseer, cl. = clerk, etc.

[2] Civil condition is suitably stated by an abbreviation : um. = ummarried, m. = married, w. = widower, widow, d. = divorced.

[3] Persons, who do not know the place of their last registration, are required [illegible]

Form F *(continued).*

Persons in my service or business but registered elsewhere (if thes pace below is too small, pecial information concerning these persons should be attached) :

.... Address : ....
.... » ....
.... » ....
.... » ....
.... » ....
.... » ....
.... » ....

I have the following lodgers (separate register forms to be attached for these persons) :

I am the owner of the following estates in the commune (a separate statement in one copy, iving information on the annual rent paid by each tenant should be filled in for each leased state) :

I am the owner of the following estates outside the commune :

Ships belonging to me :

I am the principal owner of the following ships :

Persons engaged in handicraft or home industry should state below the motive power used n their business (number of motors and and effective HP of each motor, *e.g.* : 1 electric motor f 3 HP ; 1 oil motor of 5 HP, etc. ; if power is transmitted it should be recorded as, *e.g.* : 4 HP rented).

Form F *(continued)*.

Information according to the Accident Insurance Act.

Persons employed by me :

Number employed (*Number* only, no names to be given)	During the whole year		During part of the year		Thereof persons who are not children living at home	Observations
	Male	Female	Male	Female		
in the household						
in farmwork						
in office						
in						
in						
in						
in						
in						

Every employer is required by law to state the *number* of servants and other workers his service, provided their number is less than eight. The term "worker" includes *here* n only manual workers but also other wage-earners and salaried employees, *e.g.*, clerks, enginee assistants, etc. Workers employed only part of the year as helpers at harvesting, threshin washing, woodcutting, street-sweeping, etc., should also be recorded.

GENERAL INSTRUCTIONS.

Every person should be registered where he is domiciled. Two copies, on a single sheet paper, to be filled in.

Every employee should state clearly (in the observations column) in whose service he employed.

Husband and wife living separated should each state where the other is resident ; if residen unknown this should be noted.

It is not sufficient to sign a register form with the name or stamp of the firm only ; it mu be signed in addition with the name of the person, who is responsible for the correctness of t data.

Any person who moves into a commune before the end of 1920 but after the oth persons liable to registration in the house into which he moves have sent in their forms, is oblig to hand over to the vicar a register-form at the same time as the certificate of altered residence.

If any of the data are missing or incomplete the competent police official shall demand recti cation and receive 5 crowns for each visit to be paid by the offender.

Date ....

Form G.

eference to the annual report
the principal medical officer.)

(Form to be filled in by principal medical officers and boards of health according to the circular of the Royal Medical Board, Dec. 9th, 1901.) (Form introduced on 24-I-1911.)

MMARY REPORT OF CAUSES OF DEATH in during 19 according to death certificates.

Cause of death	Males: Under 1 year	1—5 years[1]	5—10 years	10—15 years	15—20 years	20—40 years	40—60 years	60 years or over	Age unknown	Total Males	Females: [Same headings as for Males.]	Total Females	Grand Total
ngenital malformations and diseases peculiar to early infancy													
ility													
erperal septicæmia													
her puerperal diseases													
ticæmia and pyosepticæmia													
ysipelas													
allpox													
asles													
rlet fever													
htheria													
hooping cough													
luenza													
phus exanthematicus													
phoid and paratyphoid fever													
sentery													
iatic cholera													
ute anterior poliomyelitis													
ningitis													
tanus													
berculosis (a) of the lungs													
(b) other organs													
prosy													
philis (a) congenital													
(b) acquired													
ermittent fever													
her infectious diseases[2]													
seases of blood and blood-building organs													
ronic alcoholism													
her chronic poisoning													
abetes mellitus													
her metabolic diseases													
ebral apoplexy													
her diseases of the nervous system and of the organs of special sense													
anity													
ronic heart-disease													
her diseases of the circulatory system													
nchitis, acute and chronic													
ute pneumonia													
her diseases of the respiratory system													
ute gastro-enteritis													
ronic gastro-enteritis													
pendicitis													
us and hernia													
her diseases of the digestive system													
eases of the genito-urinary system													
eases of the joints and of the bones													
ncer													
her tumors													
cident													
icide													
micide													
her causes[2]													
Total													

From 1 year inclusive up to 5. etc.
To be specified.

SWEDEN. Form II.

POST CARD.

(To be used by Medical Officers.)

Principal Medical Officer

....

....

To be posted unstamped.

EPIDEMIC REPORT for the half month .... 19....

Number of cases.	Diseases.	Communes.
....	Asiatic Cholera.	....
....	Smallpox.	....
....	Typhus exanthematicus.	....
....	Typhoid and Para-typh. fever.	....
....	Scarlet fever.	....
....	Diphtheria.	....
....	Acute anterior poliomyelitis.	....
....	Dysentery.	....
....	Meningitis.	....
....	Lethargic encephalitis.	....
....	....	....
Total.	Other important diseases :	
....	Puerperal Septicæmia.	....
....	....	....
....	....	....

Notes :

Date........................

Name ....

(Medical Officer.)

If no case of disease has occurred the report should be sent in blank but dated and signed.

SWEDEN.

Form J.

N.B. Cases of plague, cholera, smallpox, typhus exanthematicus, typhoid and paratyphoid fever, cerebro-spinal meningitis, scarlet fever, diphtheria, acute anterior poliomyelitis, dysentery, meningitis and leprosy occurring where there is no medical officer, should be notified to the competent provincial medical officer by the doctor treating or otherwise observing the case on the same day or next following day. This card is intended for such notification.

This card is not to be used for notifications made in accordance with Medical Instruction No. 59 § 2 and §§ 20 and 24 of the Act on Epidemics.

OFFICIAL POST CARD.

Medical Officer

....

district of ....

....

Notification according to Medical Instruction No. 59 § 5.

Disease.	Date when disease started.	Name of the patient.	Age.	Address (parish or community and farm).

Notes :

Date :. ....

....

FINLAND.

Finland was united with Sweden till 1809, when it became a Grand Duchy unde the supremacy of Russia, till, as a result of the world-war, its independence wa secured. As long as the union with Sweden lasted, the system of vital statistics wa the same in both countries [1], being based on reports from the clergy, who had to repor on the movement of the population as well as on the number of parishioners. Whe Finland was separated from Sweden, the ordinances concerning vital statistic remained unaltered. Reports on births, deaths and marriages had to be prepare annually, whereas the table showing the number of inhabitants in various group had to be drawn up once in every five years, the material being collected by th Revenue Department of the Senate, which, however, only compiled short summarie On the whole, the system had many defects ; the schedules in use were obsolete an frequently caused misunderstanding. It was therefore considered desirable to organis official statistics on a more modern basis. After some years of deliberation, a Sta tistical Department was established in 1865, of which Ignatius was appointed directo in 1867. As in Sweden, there was considerable decentralisation, which was still mor marked after the reconstruction of the Statistical Department (henceforward calle the Central Statistical Bureau) in 1884, but population statistics remained unde the care of the latter institution. As in Sweden, a Statistical Central Commissio secured contact between the various branches of official statistics : in 1884 this dut was confided to the Central Statistical Bureau.

From the very first, Ignatius made endeavours to modernise the collectio and compilation of vital statistics, but it took several years to obtain definite result by means of an ordinance promulgated in 1877. The clergy continued to draw u parish reports as before, but the schedules were very much improved. Hitherto deaths had been grouped only in quinquennial age groups, now one-year age group were prescribed, and at the same time the year of birth had to be stated. For infant the age had to be stated by months, and even by days if death occurred during th first two weeks of life. For the enumeration of the population, which was carrie out every tenth year, very detailed prescriptions were laid down. The populatio was classified according to the year of birth, conjugal condition, and sex, and, furthe with regard to households, place of birth, language and standard of education. Th prescriptions about the grouping of the population according to occupation wer more detailed and clearer than before.

The duties incumbent upon the Lutheran clergy were later extended to other The Russian Emperor in 1825 and 1828 prescribed the same rules for Greek Orthodo congregations as for the Lutheran. In 1918 corresponding rules were introduced fo Jews. Further, in the same year, a civil register was established for persons wh

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[1] Martti Kovero : *Official Finnish Statistics*, Helsinki, 1924.

do not belong to any of the recognised churches of Finland. These elements of the population do not, however, play a very significant part. Only about 56,000 persons belong to the Greek Orthodox Church according to the enumeration of 1920. In the same year, the civil register contained only 860 names.

2. In spite of the improvements of the system, it may be said that great difficulties still exist. One of these arises from the decentralisation which seems to be more extensive than in Sweden. As remarked above, the Swedish lists are *nominative* and the Central Office elaborates the statistical tables. But in Finland, nominal rolls are not compiled, and consequently the pastor has to send in complete tables for his parish, the Central Statistical Bureau only compiling the results. It would seem preferable to let trained statisticians do this part of the work ; they could employ all sorts of mechanical inventions, counting machines, etc., instead of leaving it to the pastors who have no special training for clerical work of this kind.

Again, there are difficulties arising out of the rules laid down with regard to the *church register*. All persons inscribed in this register *(kyrk-skrivne personer)* have to be included in the decennial enumeration, even if they have left the parish in question, till their names are formally cancelled. Seamen abroad have to be enumerated in their home parish till it is known that they have died. The names of many emigrants remain in the church registers till at last relatives or others announce their deaths. Some clergymen adopt the practice, when new parish registers are taken into use, of revising the lists, leaving out the names of certain emigrants, particularly those who would have attained a very high age if still alive, but there are no uniform rules for the country as a whole. Nearly all persons who are citizens of foreign States are omitted and probably many children not yet baptised. It may also be difficult to obtain exact information regarding the distribution of the population among towns and rural districts, as the names of many persons remain on the parish registers after having settled in towns.

In the capital and some other towns a decennial *census* is taken, in connection with which there is room for reform. Thus, at the census of 1920, the important question of the number of children of each marriage was introduced. But the main object of the census being to determine the number of inhabitants who are present at a given moment, the church registers, which include only persons legally attached to the place, would give only a partial estimate.

3. In Sweden the lists of *taxpayers (mantal)* supplement the church registers to a great extent. This, however, is not the case in Finland. In spite of several prescriptions, the lists of "mantal" are not sufficiently reliable, in the opinion of Finnish statisticians, to be used to control the church register ; on the contrary, they are often based on these, and defects in the former will frequently reappear in the "mantal". The church registers are indeed the official source of information concerning persons belonging to the parish, certificates from these registers serving as legal proof. The "mantal" are only used for a specific purpose. They are only partly

nominal rolls, persons below the age of 16 being not specified individually, thougl the total number of children is inscribed (with distinction as to sex). It is probabl that many persons whose names ought to be on the lists are omitted therefrom masters frequently omitting to report the names or number of their servants ir order to evade taxation. In the towns it is incumbent on house-owners to giv particulars concerning persons residing in their houses, and here the " mantal " may b more reliable, but this does not hold good in rural areas.

It must be acknowledged that the lists of " mantal " have gradually beer improved. Originally, persons between 15 and 63 years of age were alone included but from 1765 persons of all ages, without exception, have had to be counted. A centur later, in 1865, the schedules were somewhat modified, and in 1903 new rules wer promulgated altering the regulations, particularly with regard to the distributior of population by occupation. But these improvements have not been sufficient in so far as statistical requirements are concerned.

Finnish official statistics are still more inadequate in other directions ; for example, it would be very difficult to extract information regarding the distribution of th population within the country with regard to language.

Efforts have been made to obtain information with regard to the populatior actually present, distinguishing between persons actually domiciled in the parisl and those living elsewhere, but it is doubtful whether the results are absolutel reliable.

According to the church registers, *the total population (kyrko skriven befolkning,* at the close of 1920 was 3,365,000. Out of these, about 260,000 were absent The population according to the " mantal " was 3,174,000, the difference being 191,00 or about six per cent.

With a view to improvement, Finnish statisticians have particularly recommende the introduction of *civil registers* [1]. In 1918 a committee was appointed by the Senat in order to prepare a plan for the reform of vital statistics in Finland. It issued a report in 1923 proposing a civil register, in which every person whose presence withir the boundaries of the republic is not quite temporary has to be registered. Finnisl citizens residing abroad have also to be included. This civil register would contair all the information at present to be found in the church registers. Effect has not yet been given to these proposals. In the first place, the execution of the plan wa postponed for financial reasons ; secondly, the clergy appear to be unwilling to giv up the old system. Only in the capital are there prospects of the establishment o a civil register which might lead to a more effective collection of taxes.

4. In spite of the difficulties which have been described, the vital statistics o Finland possess a very great interest. We find here, as in so many other countries, striking evidence of the rapid decrease of the birth rate. According to information

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[1] Thor Andersson : *Förslag till Befolkningsregister i Finland* (Nordisk Statistisk Tidskrift, 1923).

contained in the church registers, the birth rate in the eighteenth century was about four per cent yearly (still-born included); in the nineteenth century about 3.6 per cent, till, in the last decade, a decline commenced which continued into the present century. Thus, for instance, the birth rate for 1901-10 was 3.1 per cent and for 1918-22 only 2.3 per cent.

As in Sweden, the number of children born *out of wedlock* was relatively very small in the eighteenth century, in 1751-60 only 1.5 per cent, but the proportion rose to approximately eight per cent in the years 1911-20. Since the eighties of last century, a distinction between legitimate and illegitimate *still-born* children has been made, showing as usual a great difference (4.4 per cent of the illegitimate children being still-born, against 2.5 per cent among legitimate children).

The rates of *mortality* are also very interesting. In the middle of the eighteenth century, about three per cent of the population died each year. In 1920-22 the rate had decreased to 1.5 per cent. Finland has frequently suffered severely from scarcity and other disasters; thus at the beginning of the last century (1806-10) the rate of mortality rose to four per cent, and again in 1868 there was a very hard time, the death rate being no less than eight per cent. Compared to the level reached in the present century, the mortality was very high in 1918, viz., 2.9 per cent, influenza, as well as the revolution, being responsible for this. That year, as well as 1868, had a deficit in the balance of population, the birth rate being lower than the death rate. On the whole, the mortality is higher than in Sweden, and the expectation of life is consequently considerably smaller, viz., 43 years for males, calculated on the experience of 1911-20, and 49 for females. It may be added here that the tables of mortality have been calculated with great care, notwithstanding the various sources of error which have been described above.

The *marriage* rates too show interesting features, 9.5 per thousand of the population getting married yearly in 1751-60, against only 5.8 in 1911-20, whereas the frequency of *divorces*, as in most civilised countries, shows a movement in the opposite direction.

The following figures will give a general idea of the movements described above:

		Out of 10,000 *(Kyrkskriven befolkning)*				
	Average population (millions)	Marriages	Live births	Deaths	Natural increase	Actual increase
1751–1760...	0.46	95	449	291	158	154
1761–1770...	0.53	81	427	303	124	134
1771–1780...	0.61	86	401	249	152	170
1781–1790...	0.69	78	389	298	91	61
1791–1800...	0.77	89	401	264	137	167
1801–1810...	0.88	78	363	319	44	22
1811–1820...	1.09	85	374	264	110	118
1821–1830...	1.26	85	382	249	133	135

	Average population (millions)	Out of 10,000 *(Kyrkskriven befolkning)* Marriages	Live births	Deaths	Natural increase	Actu[al] increa[se]
1831–1840 . . .	1.39	73	334	282	52	52
1841–1850 . . .	1.54	82	355	235	120	125
1851–1860 . . .	1.69	78	359	287	72	65
1861–1870 . . .	1.79	77	344	322	22	13
1871–1880 . . .	1.92	83	370	222	148	154
1881–1890 . . .	2.21	73	350	211	139	145
1891–1900 . . .	2.54	70	322	197	125	132
1901–1910 . . .	2.90	65	311	179	132	140
1911–1920 . . .	3.27	58	254	178	76	77

On the whole, there has been an excess of births over deaths of 2.7 million which accounts for nearly the whole growth of the population.

Though the statistics of *migrations*, as we have seen, are not very exact, it ma[y] be worth while to pay some attention to these figures. A generation ago normall[y] about three per cent of the population would migrate annually from the towns, an[d] the rate of immigration was upwards of five per cent, thus producing a surplus of tw[o] per cent. In the rural districts there was a deficit, the normal yearly migrations fro[m] these districts being about two per cent and the deficit from two to three *per mill[e]*. In the years 1918-22, migrations to the towns were somewhat smaller, only 0.7 pe[r] cent in excess of the departures. The migrations to and from the rural district[s] were about 2.5 per cent, leaving a small deficit (0.1 per cent).

5. As in Sweden, the clergy in their reports on the movements of populatio[n] have had to supply information concerning the *causes of death*. The schedules sti[ll] contain heads for causes of death, and in the country this is the main source of infor[-]mation of this kind. The schedules now in use prescribe enumeration for each se[x] and age (mostly quinquennial age groups), of the number of deaths from smallpo[x] and certain other epidemic diseases, from tuberculosis, mental diseases and death i[n] child-bed, whereas all other diseases are collected under one head. Further, suicide and other violent deaths have to be specified. The incidence of the various diseases i[s] finally classified monthly. In the towns detailed statistics with regard to the cause[s] of death are more readily available. A central *health office (Medicinalstyrelsen)* ha[s] published since 1858 a yearly report of the sanitary conditions of Finland containin[g] data concerning the causes of death in the urban population. The list of causes i[s] detailed, but no distribution of deaths according to age is given. Particulars wit[h] regard to the frequency of certain diseases in the towns are also included in the report as well as a list of cases of epidemic diseases in the country as a whole. Statistic[s] of diseases treated in the hospitals, of violent deaths, and of venereal diseases treate[d] are also given.

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» » » » » 1920 (1923).

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Annex.

FINLAND.

Form A.

Province of ....

Diocese of.............

MOVEMENT OF POPULATION IN 1924.

Data of the movement of population in ....
the Congregation of .... *Parish of* .... *Deanery of* ....

NOTES.

....

....

....

I. NUMBER OF BIRTHS AND NUMBER OF MARRIED COUPLES, BY MONTH.

Month.	Live-births.						Stillbirths.						Married couples.
	Leg.		Illeg.		Total		Leg.		Illeg.		Total.		
	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	
Total Grand total													

Form A *(continued)*.

II. DEATHS BY MONTH.

Month.	0-1 year of age.				1-4 years.				5-14 years.		15-59 years.		60 years or over.		Total		Deaths due to:					
	Leg.		Illeg.		Leg.		Illeg.										Illness.		Causes mentioned in Table VIII.		Suicide.	
	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
Total Grand total																						

Form A *(continued)*.

III. CONFINED WOMEN GROUPED BY AGE.

	Under 15 years of age.	15—19	20—24	25—29, etc., up to 49	In the 51st year.	In the 52nd year	In the 53rd year.	In the 54th year.	In the 55th year.	Total
Women who have borne legitimate children :										
1 infant										
Twins										
Triplets										
4 or 5 children at the birth ..										
Total										
Women who have borne illegitimate children :										
1 infant										
Twins										
Triplets										
4 or 5 children at the birth ...										
Total										

IV. DISSOLVED MARRIAGES

Number of marriages dissolved by :	
Death of husband	
Death of wife	
Divorce	
Total	

V. MARRIED COUPLES GROUPED BY AGE.

Age of husband.	Age of wife.								These marriages contracted between :			
	15 years.	16 years.	17 years, etc., up to 20	21-24 years.	25-29 years.	30-34 years, etc., up to 69	70 years or over.	Total	Two unmarried persons.	Widower or divorced man and unmarried woman.	Widow or divorced woman and unmarried man.	Widowed or divorced persons.
17 years................												
18 »												
19 »												
20 »												
21—24 »												
25—29 » etc., up to 69 ...												
70 or over..............												
Total												
These marriages contracted between :												
(a) Two unmarried persons..												
(b) widower or divorced man and unmarried woman .												
(c) widow or divorced woman and unmarried man ...												
(d) widowed or divorced persons												
Number of cases in which the woman belongs to the congregation and the man to another religions community .												

Form A *(continued)*.

VI. DEATHS CLASSIFIED BY AGE, CAUSE OF DEATH, AND CIVIL CONDITION.

	Males [the same for Females].								
	Under 1 year of age.	1 year.	2 years.	3—4.	5—9.	10—14.	15—19, etc., up to 89.	90 years or over.	Total.
Smallpox									
Scarlet fever and measles ...									
Dysentery									
Asiatic cholera									
Diarrhœa, infantile									
Pulmonary Tuberculosis.....									
Tuberculosis, other forms ...									
Mental diseases............									
Puerperal diseases									
Other diseases..............									
Causes of death mentioned in table VIIIa									
Suicide									
Total									
Unmarried									
Married									
Widowers and widows									
Divorced									

VII. DEATHS CAUSED BY DISEASES, BY MONTH.

Month.	Smallpox.	Scarlet fever and measles.	Dysentery.	Asiatic cholera.	Infantile Diarrhœa.	Pulmonary Tuberculosis	Tuberculosis, other forms.	Mental diseases.	Puerperal diseases.	Other diseases.	Total.
Total											

VIII. VIOLENT DEATHS.

Accidents and deaths caused by a third party.									Suicides.		
	Male.	Fem.		Male.	Fem.		Male.	Fem.		Male.	Fem.
Starvation			Explosions or shots :			Lift and crane accidents...........			Shot		
Drowning			Accidental shot			Falling trees, logs, etc.............			Stabbing or cutting .		
Freezing			Explosion			Earth-falls			Hanging or strangulation............		
Burns, burning			Murder or manslaughter			Falling from a height			Polisoning		
Sunstroke						Kicks by animals . .			Crashing to death....		
Lightning						Tossed by animals					
Electrocution			Infanticide..........								
Poisoning :			Capital punishment. .			Other violent deaths :					
Gas			Fallen in war								
Alcohol			Crushed to death :								
Snake-bite			Motor-car accidents								
			Tramway accidents								
			Railway accidents .								
			Flying accidents . .								
Suffocation			Accidents from engines, machinery or transmission gear			Total			Total		

Form A *(continued)*.

IX. DEATHS GROUPED BY AGE AND YEAR OF BIRTH.

a	b	c	d	e
Age.	Males.	Females.	Total.	Year of birth.
0—1 year.				1924
1—2				1923
2—3				1922
3—4				1921
4—5				1920
5—6				1919
6—7				1918
7—8				1917
8—9				1916
9—10 etc., up to 101.				1915
Total				

X. DEATHS UNDER ONE YEAR OF AGE BY EXACT AGE.

Males.			
Time of death:	Leg.	Illeg.	Total.
1 day			
2 days....................			
3 »			
4 »			
5 »			
6 »			
7 »			
8 » .... etc., up to 15th day.			
16th day to 1st month.			
2 months			
3 »			
4 »			
5 »			
6 »			
7 »			
8 » .... etc., up to 12th month.			
Total			

(Identical Table for female sex.)

XI. REMOVALS.

	Number of certificates of altered residence.	Persons.			Persons removed classified by the place of removal:									
					Other congregations in the same community.		Civil register.		Other communities in the same county.		Other counties in Finland.		Abroad.	
Additions to the congregation		Males.	Females.	Total.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.
from towns														
from rural districts														
Total														
Removals from the congregation:														
into towns														
into rural districts														
Total														

Table drawn up by:

Reviewed and approved by:

FINLAND. Form B.

County of............ Diocese of.........

POPULATION ON DECEMBER 31st, 1920

Data of population in the parish of............................

Deanery of...............

GENERAL REMARKS.

....

....

....

Table I. A. — Persons RESIDENT in the parish, classified by year of birth and civil condition.

Year of birth	Number of persons born during the year		Number of these							
			Unmarried		Married		Widowers and widows		Divorced	
	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females
a	b	c	d	e	f	g	h	i	j	k
1920										
1919										
1918										
1917										
1916										
1915										
1914										
etc. from 1821										
Total										

Table I. B. — Persons NOT RESIDENT in the parish, classified by year of birth and civil condition.

(The same as Table I, A.)

Table II. — TOTAL POPULATION OF THE PARISH, CLASSIFIED BY PLACE OF BIRTH.

		Born in another parish (town) in the same county	Born in the same parish (town) where now resident	Born in another county of Finland									Born in						Place of birth unknown	Total
													Sweden	Norway	Denmark	Russia	U. S. A.			
I. Persons resident in the parish	Males																			
	Females																			
II. Persons not resident in the parish	Males																			
	Females																			
Total																				

Form B *(continued)*.

Table III. — **PERSONS RESIDENT IN THE PARISH, CLASSIFIED BY LANGUAGE AND EDUCATION.**

	Finnish speaking		Swedish speaking		Russian speaking		German speaking				Total	
	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females
Persons 15 years of age or over :												
Persons with more than elementary school education.												
Literate persons.												
Persons able to read												
Illiterate persons												
Persons under 15 years of age :												
(The same particulars as above.)												
Total												

Table IV. — **PLACE OF RESIDENCE OF PERSONS NOT RESIDENT IN THE PARISH.**

Other places of residence																Residence unknown		Total	
In Finland		In Russia		In Sweden		In Norway		In the U. S. A.											
Males	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females

Form B (continued).

Table V. — PERSONS RESIDENT IN THE PARISH, CLASSIFIED BY OCCUPATION AND INDUSTRY.

Occupation and industry of the head of the household	Heads of households and single independent persons		Their wives (husbands) and children and any other members of the family who have no special occupation and take no part in the occupation of the head of the family		Children and other members of the family who take part in the occupation of the head of the family		Personal servants of the aforementioned persons		The wives (husbands), children and other members of the family without occupation of the persons mentioned in the previous column.	
	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females
a	b	c	d	e	f	g	h	i	j	k
Agriculture										
1										
2										
Industry										
1										
2										
Total										

Table drawn up by.....

(Name) : ______________________

(Title) : ______________________

Table examined and approved by.....

(Name) : ______________________

(Title) : ______________________

DENMARK.

1. As observed in the introductory chapter, the organisation of vital statisti in Denmark and Norway in the eighteenth century was less developed than in Swede The statistical institution founded in 1797 (Dansk-Norsk Tabelkontor) was n influential enough to secure any real progress of statistics [1]. It ceased to exist i 1819. Several years later another institution was created, in more auspicious ci cumstances, the "Tabelkommission", a Commission consisting of members fro various Government departments; the number was originally five, but later it wa raised to nine by an extension of the work of the Commission to the Duchies of Sleswi Holstein and Lauenburg. This Commission was in existence from 1834 to 1848. published several volumes, including a report of the census of 1834, which also co tained the results of the previous census of 1801, which had not before been publishe As in all other civilised countries, there was at that time a great enthusiasm f statistics, which were engaging the attention of several energetic scientists, particular of the medical profession, and the Commission had therefore no difficulty with rega to assistance in its work. But in the course of time an institution of this kind wa found to be insufficiently stable and it was necessary to consolidate its work by reorganisation. A statistical bureau was founded in 1850 and, as in Sweden, th middle of the century thus witnessed an important step in advance. Unfortunatel the bureau had very small financial means. It was made more independent in 189 and still more so in 1913, when it became known as the *Statistical Department.* I contrast to developments in Sweden, statistics were centralised, though some subjec remained in the care of certain other Government institutions. The position of th Statistical Department was considerably strengthened during the World War, whe it rendered important services, for instance, with regard to food regulations. *Municipal Bureau* of Statistics for Copenhagen was founded in 1883.

The collection of vital statistics originally rested with the *clergy*, as in Sweden The pastor had to write reports on marriages, births and deaths. When a censu was taken, as in 1787 and 1801, he had to enumerate the members of his congregation The dates of these two censuses were fixed for Sunday, July 1st, and Sunday, Februar 1st, but actually the census was spread over weeks in each case, the pastor eac Sunday arranging for as many of his congregation to meet as he could manage t put down in his lists. In the towns—where the population at that time was only one fifth of the whole—the magistrates had charge of the census. The principles were th same as in Sweden, in so far as the census aimed at finding the population legally be longing to any given place, including persons absent at the moment of the census. Bu it follows from what has been said that the system was not nearly as complete as in

[1] Ad. Jensen: *The History and Development of Statistics in Denmark* (Koren: l. c. 1918)

Sweden; between the two censuses there was no enumeration of the population comparable to that of the Swedish " Tabelvärk ".

The census of 1834 was taken on February 18th. The prescriptions were somewhat altered. In the country the pastor had to superintend the work with the assistance of schoolmasters, who had to go from house to house, day after day, till the work was done. As in 1801, it was the population actually domiciled in the place concerned which was counted. It was the duty of the pastors in the rural districts, and of the magistrates in the towns, to prepare the results of the census in the form of two tables concerning the population of the parish or the town, one distributed according to age, sex, etc., the other according to profession : this was a retrograde step. The original nominal rolls had to be sent to the Commission, but they were hardly used, the Commission only compiling the various tables which it received. This decentralisation of work in all probability detracted from the reliability of the census.

The next census was taken in 1840 and subsequently at five-yearly intervals till 1860, the date in each case being the first of February. Various improvements were made, particularly with regard to occupation. In 1845 abnormal individuals were enumerated.

For the first 20 years after the foundation of the Statistical Bureau (in 1850) there was no real progress in the matter of vital statistics. The work continued to be over-decentralised. The clergymen in the country and the magistrates in the towns had to prepare complete statistical tables from the original material, in the form prescribed by the Bureau, the latter institution only compiling the tables and writing the text of the report. In 1870, however, a real step in advance was taken. The local authorities (parish councils and magistrates) were given charge of the census, the Bureau working out all the tables from the original nominal rolls. The Bureau had thus much more liberty of action ; there was no necessity to decide on the form of the tables before the census was taken ; new problems which arose could be dealt with on the basis of the original material. The accuracy of the results was probably all the greater and there was more uniformity in the detailed work, notably with regard to the distribution of the population according to occupation.

The municipal office in *Copenhagen* contributed considerably to this progress. Two extra local censuses were taken here, in 1885 and 1895; the intercensal period for the country as a whole was 10 years, till February 1st, 1901, when quinquennial censuses became the rule (the last census taken was on November 5th, 1925).

In 1870 another important change had been made : every person was enumerated who had passed the night before the census in the place, whether his home was elsewhere in the kingdom or abroad. On separate lists the names of all persons were inscribed whose presence—or absence—was only temporary, so that it was comparatively easy to find how many persons had their home within the boundaries of the kingdom.

In what follows I shall confine my remarks to the last census report (February 1st, 1921).

In the towns the lists were filled in under the control of the owner of the hou
or his representative ; in the country by a person specially appointed by the par
council. This had to be done in the course of three days. The lists contained t
full name, sex, year and day of birth, as well as information concerning the mari
condition, the birthplace and previous place of residence and year of removal fro
it. The schedule enquired as to the religious belief and the position of the individu
in the household (child, lodger, servant, etc.). There were heads for occupati
(employer or employed) and for the name of the firm in which the person concern
is employed ; if out of work, this had to be stated. There were separate questio
concerning persons who were blind, deaf and dumb, idiots (specially those w
were born feeble-minded) or insane and persons who were only temporarily reside
There was also a question concerning the income, which had to be answered by t
local authorities.

Having all modern technical aid (electric counting-machinery), the departme
has been able to work out all the tables desired in a relatively short time by mea
of individual cards on which all particulars are inscribed by perforation.

As a matter of fact, absolute accuracy cannot be obtained even if every ca
be taken to avoid mistakes. Thus the number of migrations can never be determin
exactly : 35,911 persons were temporarily present, and out of these 29,533 we
described as domiciled somewhere else in the kingdom and 6,178 outside of t
country, whereas information regarding 200 persons was lacking. But the numb
of the temporarily absent was 29,368, and out of those 24,822 were registered
being somewhere else within the borders of the kingdom. There were thus abo
5,000 persons who were not found among the temporarily absent, though th
were registered as temporarily present. Among a population of upwards of thr
millions, this difference may, in most respects, be said to be insignificant, and ev
testifies to the reliability of the census. With regard to ages it was not always possib
to avoid mistakes ; too many persons expressing their age in " round numbers
and many others are ignorant of the year of their birth and therefore give an approx
mate date. As an illustration of this, 46,960 persons were 29 years of age, 47,6
were 30 and 45,409 were 31. Of rather more importance is the fact that the a
of 9,552 persons was unknown, three per thousand of the population — not a lar
figure, however. For 774 persons the marital condition was not stated.

In Danish official statistics there is no direct way of observing *migration*
certain conclusions can be drawn indirectly, however, with regard to this importa
problem. Information concerning the year in which the persons concerned settl
in the place in question is sometimes lacking, thus adding to the difficulty : in 19 cas
out of 100 this date was wanting.

With regard to the many-sided question of the number of persons who are *su
ported by others*, or who wholly or partially *gain their own living*, combined wi
age and marital position, rather exhaustive information has been obtained. Info
mation concerning *occupation* is also rather complete, with a classification und
377 heads. In numerous tables the age distribution and income are given in vario

occupations and classes of society : for several selected occupations a combined distribution according to age and income has been worked out. The results lend themselves to many interesting sociological investigations, showing, for instance, an increasing average income till between 40 and 50 years of age, after which the income gradually declines, but with many differences between the various classes of society. The peasant farmers, for instance, reach their maximum income between 50 and 60 ; agricultural labourers before 40, etc. The distribution of the population according to income was also dealt with on the basis of the previous census of 1916.

In certain respects some of the earlier publications of the statistical department contained fuller information than the last census reports. Thus the census report of 1901 dealt with the important question of the *number of children born* and alive in existing marriages, following the example of the municipal census for Copenhagen 1880, the observations of which were treated by private efforts [1]. The census reports, 1901 and 1911, give the number of *households* and their distribution according to size, and in Copenhagen *migrations* were considered, as far as this problem can be dealt with through the census alone.

The census schedules in the capital contained questions as to the year of immigration as early as 1906 ; though somewhat incomplete, the material yielded results of interest with regard to this important sociological problem.

2. The regular census has not been the only source of information with regard to the population. Thus in 1897, and later in 1906 and 1914, the *industry* of the country was reviewed. For every employer the number of working men was reported according to age, sex, etc. As observed above, the distribution according to *occupation*, age and income was recorded by means of the lists of *taxpayers* and the census of 1916. The results of this census were at first issued in a rather summary way, but a separate report followed giving detailed information with regard to these questions. As in 1921, it was incumbent on local authorities to inscribe particulars on the schedules regarding income. The additional information extracted from the lists of taxpayers, supplementing that contained in the lists of the census, has contributed to the reliability of population statistics.

3. As remarked above, Sweden and Finland have better material for the study of *migrations* than has Denmark. The transatlantic emigration is controlled here as in most other European countries, but in other respects particulars regarding yearly migrations are lacking ; they can only be studied indirectly by means of the census. On the other hand, statistics of *marriages*, *births* and *deaths* are fairly complete. In this field, progress was made in 1911. Previously the system was the same as in Sweden and Finland ; the clergy had to prepare lists in accordance with a certain schedule and naturally it was felt impossible to ask all the questions which were of interest. Thus the ages were given mostly in quinquennial groups, and for the

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[1] Rubin and Westergaard. *Aegteskabsstatistik*, Copenhagen, 1890.

brides and bridegrooms only summary statements regarding previous conjuga condition was given without showing age distribution. But in 1911 an importan change was made; the clergy were then instructed to send individual informatio with regard to the data concerned. Thus the statistical department was able t deal with the original material instead of working on the reports from the clergy with the result that many more questions in vital statistics could be studied withou adding to the work of the clergy. The extraction of individual information fron the church registers is probably an easier task for the clergy than the preparatio of the lists which they formerly had to undertake. In Copenhagen the clergy hav only to report births and marriages, the Health Officer of Copenhagen having t supply information concerning deaths and still-births.

Even before this reform, Danish vital statistics may be said to have been rela tively exhaustive. Thus, as to marriages the frequency of marriage at each age ha been worked out for men and women since 1845, but not for widowers, bachelors etc., separately. From information supplied by the Ministry of Justice, the numbe of *divorces* since 1896 is known. As to the births, the age of the mothers has bee reported since 1860 (for Copenhagen since 1878), so that the study of the decreas of fertility in Denmark is much facilitated. It is possible to compare mortality amon bachelors, married men and widowers, and the mortality in various parts of th country, though here the same difficulty as was referred to in the case of Swede arises due to the fact that many persons die in urban hospitals away from thei homes—a difficulty which cannot be overcome as completely as in Sweden.

But since 1911 the quinquennial reports of marriages, births and deaths hav much facilitated matters. It is now possible to calculate rates of marriage, accordin to age, for widows or widowers separately, which formerly could only be deduce by indirect methods. There is a very considerable difference between the marriag rates for bachelors and widowers, the rates for the latter at some ages being at leas twice as high as those of bachelors, whereas the rates of marriage for widows at mos ages were lower than those for spinsters. Further, the age distribution of bride and bridegrooms in various occupations can be ascertained and, as a curiosity, th distribution of weddings in various classes, according to the days of the week, show ing, for instance, how unpopular Monday is as a wedding day. Birth statistics ar now more complete, for instance, with regard to multiple births.

As to mortality statistics, deaths can now be given for each year of age. It i thus possible to calculate mortality tables with considerably more accuracy tha formerly. A further advance was made in 1921, since when the year of birth ha been reported in each case. As already stated, the rates of mortality in variou parts of the country were not very accurate, chiefly because of the urban hospita lisation of non-resident patients. These sources of error have been overcome for th years 1916-20, Denmark now being on a par with Sweden in this respect. Accordin to this investigation, the numbers of deaths in Copenhagen have to be reduced b two per cent, in the provincial towns by no less than 18 per cent, whereas the death in rural districts have to be increased on an average by 11 per cent.

Last, but not least, recent reforms of vital statistics have made it possible to calculate rates of mortality for various classes of the population. As the first step in this direction, the infant mortality has been calculated according to the father's position in life.

4. In 1924 a very important Act came into operation which may in the future prove to be of great assistance to vital statisticians. This Act prescribes *civil registers (Folkeregistre)* for the whole population in all towns and country parishes. The food regulations during the war made it necessary for the local authorities all over the country to keep accurate registers of the inhabitants, and even after the war it was felt useful to continue such registers. A commission was therefore appointed to make a report, and as a result a bill was framed in 1922 which led to the Act of 1924. Denmark thus followed the lead of *Norway*, where the introduction of civil registers was of a much earlier date (see page 43). As early as 1918 Copenhagen took steps to create a municipal register, largely modelled on the register in Christiania (Oslo). An Act of 1921 made it incumbent on all municipalities in Denmark to preserve the registers created for the purpose of food control, all persons leaving the town having to report the fact. In Copenhagen the magistrate had powers to enforce the reporting of all removals from or to the city. The magistrate was further authorised to introduce a civil register, and a local census was taken on February 1st, 1923, in order to verify the accuracy of the material. The schedules contained the usual questions, and the lists were revised by the Tax Office of Copenhagen. Various registers are kept. In the *chief register* there is a card for each household containing particulars as to husband, wife and children, whereas other members of the household, such as servants, lodgers, etc., each have their own cards. Further, there are additional registers, namely, an alphabetical register facilitating the control, and a register containing the names of all persons who leave the city or who die and women who marry. All citizens have to report removals and any changes in connection with the household, and should a person remove to another municipality he obtains a certificate which has to be delivered in the new place of residence. The register can be used to control the payment of taxes, parliamentary and municipal elections and to assist the work of the police, the Poor Board, etc. Private persons can also apply to the register for personal information.

The Act of 1924 now prescribes similar registers all over the country. These registers are to include all persons in the municipality concerned; births, "name-givings" and deaths have all to be registered here, and every person who removes from the place or settles there shall also be registered. The local authorities are entitled to take a census every year in order to verify the register; the general census also serves as a control. Though not directly introduced to improve vital statistics, the registers may in time be most useful in this respect, especially as regards *migrations*, and it is to be hoped that this system in future will secure for Danish population statistics the same reliability and completeness as those of Sweden [1]. The next advance may be the civil registra-

tion of all marriages, births and deaths, which has hitherto been entrusted to t
clergy. Bills of this kind were introduced in 1913 and 1922.

5. Denmark has had for a long time reliable statistics of the *causes* of death i the urban population. This material was treated by the statistical bureau for t years 1876-89. Later, the Health Department *(Sundhedsstyrelsen)* was entrust with the task of working out statistical reports on the causes of death. Separa reports on suicides and fatal accidents were published by the Statistical Bure (later the Statistical Department) based on coroners' inquests. Steps are bei taken to include statistics of causes of death in the quinquennial reports of the Stat tical Department, thus eventually making the reports on deaths from the cler superfluous, and basing mortality statistics on the medical certificates alone.

A notable improvement was effected in 1921. The causes of death are n registered in all parts of the kingdom, not only in the towns, so that it will hereaft be possible to follow the trend of mortality from all diseases all over the countr The causes of deaths are as a rule certified by medical men. In rural districts, howev where the distance of the dwelling of the deceased person is more than two kilomete from the nearest practising physician, laymen may give certificates stating t presumed cause of death, which have subsequently to be verified by the doctor w treated the deceased. In Copenhagen the certificates of deaths are sent to a municip office, which forwards them to the Health Officer of Copenhagen, who is responsib for the statistical treatment of the material : outside Copenhagen the clergy have collect the certificates and send them to the health officer, by whom they are tran mitted to the Health Department. In the case of violent deaths special certificat are prescribed ; there are also special forms for reporting still-births (for midwiv as well as for the physician). Great care is taken to secure accuracy with regard the residence of the deceased.

On the whole, the material appears to be reliable, though, of course, there a small differences between the statistical data supplied by the clergy and by t health officers respectively. In 1923 the total number of deaths according to medic statistics was 38,140 ; according to clerical statistics it was 37,902, the differen being only 0.6 per thousand.

Morbidity statistics cannot, of course, attain the same accuracy as mortalit statistics. Danish legislation has gradually tried to secure statistical observatio of this kind, particularly through an Act of 1915 concerning contagious disease Every practising physician has to report each week to the health officer of the distri concerned all cases of contagious diseases which he has treated. The cases are class fied in the reports in five age groups, and—for adults—according to sex. Serio efforts are being made to secure reliable statistics of cases of tuberculosis and venereal diseases.

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[1] Dalhoff : *Et Folkeregister i Danmark*. Dahlgaard : *Københavns Folkeregister* (Nordis Statistisk Tidskrift, 1, 1922, 2, 1923).

6. It may be of interest to summarise the yearly movements of population per ,000 inhabitants in times past :

	Marriages	Live births	Deaths	Surplus of births over deaths.	Actual rate of increase
00–1809	82	312	244	68	76
10–1819	90	314	221	93	93
20–1829	82	313	214	99	106
30–1839	80	302	236	66	63
40–1849	78	303	206	97	113
50–1859	88	324	205	119	123
60–1869	75	310	200	110	110
70–1879	78	312	192	120	99
80–1889	74	321	187	134	100
90–1899	72	303	177	126	109
00–1909	73	288	146	142	118
10–1919	73	250	130	120	120
20–1923	82	235	118	117	112

These figures show on the whole the same tendencies as those of Sweden. The ecrease of fertility of the last generation is conspicuous, and, though the death rates re decreasing, improvement of health cannot keep pace with the diminishing birth ate. All the same, a natural increase of population of 12 per thousand is very coniderable. Only in one year (1831) did the number of deaths exceed the number of irths ; even in 1853, when Denmark was ravaged by a cholera epidemic, there was a atural surplus of 10 per thousand.

As to the *expectation of life* at birth, the following table illustrates great sanitary rogress :

	Male	Female		Male	Female
1840–1849...	40.9	43.5	1906–1910...	54.9	57.9
1860–1869...	43.6	45.5	1911–1915...	56.2	59.2
1895–1900...	50.2	53.2	1916–1920...	55.8	58.1

These figures are evidence of satisfactory public health conditions : in this respect enmark competes with Sweden, but in the latter country the infant mortality ate is lower, only about seven per cent of new-born children in Sweden dying within he first year of life, whereas in Denmark the infant mortality rate is nine per cent. comparison of the rates of mortality later in life is more favourable to Denmark. hus, at the age of five the expectation of life in Denmark in 1911-15 was about 60.8 ears, in Sweden 59.4 years.

The proportion of *illegitimate* births to the total number of births increased in he past century from about seven per cent in 1801-09 to 11.5 per cent in 1840-49. hereafter the ratio decreased and reached a minimum at the close of the century. fterwards the ratio increased again, being about 11 per cent in 1916-20, but actually llegitimate births are less frequent now then a generation ago.

7. A most interesting part of Denmark is the *Faroe Islands*, with about 23,0 inhabitants. In spite of considerable practical difficulties, comparatively complete vi statistical data are available and exhibit many remarkable features. In these remo islands the birth rates are relatively high and the figures do not as yet show the usu decline. If the number of births according to the age of the mothers be compar with similar figures for Denmark proper, we find in 1916-20 about 1,750 expect births against 3,180 actual births, so that there were 82 per cent more births th expected. The relative number of illegitimate births is very small, only from t to three per cent. The birth rate in 1916-20 was 3.1 per cent of the population.

The *death rates* are low, especially among infants ; whereas in Denmark prop about 12 per cent of the children born alive die in the first five years of life, the co responding figure in the Faroes is only six. In the first year of life the death rate only four per cent. This is an uncommonly low rate. Later in life mortality amo males is about the same as in Denmark proper, owing to the large number of fat accidents ; though suicides are exceedingly rare, fatal accidents among adult mal are responsible for about one-third of the deaths. The female mortality is on t whole low, except in the child-bearing period of life. The sporadic nature of epidemi is very characteristic. Thus in 1914 there was not a single case of measles : in t two following years there were about 1,600.

8. The Danish colony *Greenland*, with its extremely scattered population, c hardly have a system of vital statistics as reliable as that of Denmark itself. far as possible, however, the same lines are followed. The last census, which w taken on October 1st, 1921, showed that there were about 14,000 native inhabitan The age distribution is very different from that of the Danish population, only thr per cent being above 60 years, against about ten per cent in Denmark. The birth ra is very high, about four per cent ; the rate of mortality is also very high, on an avera three per cent. Calculating the number of deaths expected, according to the Dani life table, we find that in 1914-23 they amounted to only 30 per cent of the actu deaths reported in Greenland. A considerable part of this high rate of mortali is due to accidents, especially at sea. In the years 1902-11, altogether one-third the deaths were due to accident ; these accidents are particularly frequent in Sou Greenland, where fishing from Kajaks is going on all the year round, and the fact th the rates of mortality in this part of Greenland are higher than in North Greenla is thus partially explained.

Medical statistics for Greenland labour under great difficulties. Since 1923 t health officers have received the same schedules as their colleagues in Denmar and it is to be hoped that the data will thus be more reliable. Mortality, on accou of epidemics, varies very much from one year to another. Thus in 1920 the epidem mortality was nearly twice as high as in the two preceding years. Tuberculosis particularly frequent, but reliable statistical data are not yet to hand.

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Annex.

DENMARK. Form A.

POPULATION CENSUS, November 5th, 1925. PROVINCIAL TOWN

CENSUS TABLE No. ....

for the house mentioned below in the town of ....

Name of Parish .... *Registration number of the house* ....
(if the Commune is divided into several Parishes) *Street number of the house* ....

Name of the street (road or square) .... *Name of proprietor* ....

RULES.

....

....

....

Summary of all persons living in the house and of all its apartments.

(To be filled in by the landlord or manager.)

	Number of apartments.	Number of persons in the apartments.	
		In the principal table.	In the supplementa table.
(a) Premises used solely for dwelling purposes....			
(b) Premises with workshop, shop, etc., also used for dwelling purposes			
Total...			

....

PRINCIPAL TABLE.

Position of the apartment in the house.	Registration number of the family. Single persons are also counted as families, except lodgers. Lodgers, whether alone or members of a family, should be marked with a x. Persons temporarily absent should be marked "abs".	FULL NAME Children not yet named should be marked as "boy" or "girl". Persons staying temporarily in the house should not be recorded here but on the back of the form. Surname. All christian names (in the right order, that ordinarily used to be underlined).	Sex.	Birthday.	Year of birth.	Birthplace.	Nationality.	Civil condition.	POSITION IN THE FAMILY (husband, wife, child, relation, house assistant, lodger, etc.	OCCUPATION OR STATUS If more than one occupation, all should be given beginning with the principal occupation. If the wife or the children have special occupations, these should be stated. State clearly the trade and the position in the trade. If dependent mainly on private income, private relief, old age pension, poor relief state this as well[1] as the occupation. If no longer occupied add the letter "p".	Address on November 5th, 1924.	Not to be filled in.			NOTES State here the full address of persons temporarily absent (marked "abs." in col. 2). Any other remarks.
												a	b	c	
1	2	3	4	5	6	7	8	9	10	11	12		13		14

Note: Owing to lack of space, full details are not given.

Form A *(continued)*.

SUPPLEMENTARY TABLE FOR PERSONS STAYING TEMPORARILY IN THE HOUSE.

Registration number of the family, where staying according to the principal table.	FULL NAME (Ident. with col. 3, principal table. See this.)	Sex.	Birthday.	Year of birth.	Birthplace.	Nationality.	Civil condition.	Position in the family in place of *permanent* residence.	OCCUPATION OR STATUS The statement should show clearly whether principal or assistant. If no longer occupied add the letter "p".	State here *the Communal register* in which registered, and the *address*. If not registered, state the reason (*e.g.* resident abroad, in which case the country should be given).	Notes.	Not to be filled in.
1	2	3	4	5	6	7	8	9	10	11	12	13

DENMARK. Form B.

Month .... 19....

SUMMARY REPORT
of
MARRIAGES, BIRTHS, DEATHS and CONFIRMATIONS.

Parish : ....

District : .... County : ....

	Number.	
Marriages (ceremony performed by church)		
» (blessed by church)		
	Males.	Females.
Livebirths		
Still-births		
Deaths (still-births not included)		
Confirmations		

Date : ....

Signature :

....

Note : This form should be sent with the extracts from the parish-register to the Statistical Department. Note carefully that the number of certificates of marriages, births and deaths corresponds to the number recorded on this form.

The figures for still-births and deaths not to be filled in for Copenhagen.

DENMARK.

Form C.

POPULATION REGISTER OF COPENHAGEN.

	1. Husband.		Wife.	
Name.				
Date of birth.		Position in the household		Position in the household.
Birth-place.				When moved into the commune.
Civil condition.				Last permanent address.
Occupation.				
Right of voting.				

5. Moving in		Moved in from:	Removal.		Removed to:
Notified.	Occurred.		Notified.	Occurred.	

11. Notes.

4. Address in the commune.

Year.	Day.	Street (road or square).	No.	Floor.	Note.

6 Nationality.

7. Convicted of felony and civil rights restored.

9. Declared incompetent.

10. Adjudged bankrupt.

8. Poor relief.

Form C. *(continued)*.

Name.	1. Husband.		2. Wife.	
Date of birth.		Position in the household.		Position in the household.
Birth-place.				When moved into the commune.
Civil condition,				Last permanent address.
Occupation.				
Right of voting.				

3. Children under 15 years of age. Name.	Sex.	Date of birth.		Birth-place.	Note.
		Year.	Day.		

4. Address in the commune.					
Year.	Day.	Street (Road or Square)	No.	Floor.	Notes.

DENMARK. Form D.

Male. Year 19....

BIRTHS.

(Outside Copenhagen this form is used also for still-births.)

Parish (Registration district) : ....

District : .... County : ....

Registration number : ....

Date of birth. Month : .... Day : ....

Liveborn or stillborn [1] : ....

Legitimate or illegitimate : ....

If twin, triplet, etc., this should be stated, referring to the registration number of the child (ren) born at the same birth ....

	Father	Mother
Occupation (status) [2]		
Date and year of birth		

If father (or for illeg. child, mother) was born abroad, state if possible the birthplace:

[1] Prematurely born children born alive to be recorded as live births. Any fœtus born without obvious signs of life in the 29th week of pregnancy or after should be recorded as a still-birth; but if before the 29th week it should be deemed a miscarriage and not recorded.

[2] State, if possible, trade and position in trade, *e.g.*, bank director (not director), master shoemaker, journeyman shoemaker (not shoemaker), etc.

DENMARK. Form E.

Male. Year 19....

DEATHS

(Still-births not included.)

Parish (Registration district) : ....

District .... County : ....

Registration member : ....

Date of death. Month : .... Day : ....

Name : ....

Occupation (Status) [1] : ....

For dependent wife, children and other persons, state occupation of the husband, father (mother) or supporter ....

Last permanent address [2] : ....

Civil condition : ....

Date and year of birth [3] : ....

For children under 5 years of age, state whether legitimate or illegitimate : ....

If the deceased was born abroad, state birthplace if possible : ....

....

[1] State, if possible, trade and position in trade, *e.g.*, bank director (not director), master shoemaker, journeyman shoemaker (not shoemaker), etc.

[2] Town and parish or province.

[3] If the child died within 24 hours of birth, state this.

DENMARK. Form F.

A. DEATH CERTIFICATE issued by a doctor

for child under one year of age
(or live-born miscarriage)

(This form is not to be used in cases of death due to accident. See Act, May 4th, 1875.)

(1) Full name (for unnamed child : sex).	
(2) Date of birth and birthplace.	Date and year of birth. Birthplace.
(3) Legitimate or illegitimate.	
(4) Was the child kept by its parents ? If not, by whom ?	
(5) Name and occupation of father (or mother, if illegitimate).	
(6) Breast fed or artificially fed before the disease set in (how long ?)	
(7) Last permanent address.	*Town :* Street, street number, and floor. *Country :* Village, parish.
(8) Date of death and age at death.	*Date :* *Age :*
(9) Place of death (if died in hospital or clinic, state this).	*Town :* Street, street number, and floor. *Country :* Village, parish.
(10) Cause of death and chief complications.	*(a)* In case the child was treated by the undersigned doctor *(b)* » » » another doctor : *(c)* » » died without medical care :
(11) Duration of the disease.	
(12) Signs of death (clearly described ; expressions as " general signs " may not be used.)	

The undersigned doctor has (date) ....
examined the body of .... and has found the above-mentioned certain and unmistakable signs of death.

....

....

(Name and address of the doctor to be given clearly.)

Recorded in the parish register of .... Date : ....

Date of burial : ....

DENMARK. Form G.

Duplicate.

C

DEATH CERTIFICATE issued by a doctor

for a stillborn child.

(1) Sex of child.	
(2) Legitimate or illegitimate.	Date of birth :
(3) Name and occupation of parents or, if illegitimate, of mother.	
(4) Age of mother.	
(5) Permanent address of parents (or mother).	*Town :* Street, street number, floor. *Country :* Village, parish.
(6) Birthplace (if born in a clinic or maternity hospital, state this).	*Town :* Street, street number, floor. *Country :* Village, parish.
(7) Was the child fully developed; if not, by how many weeks prematurely born ?	
(8) Was the child naturally born or with artificial help ?	
(9) Probable cause of death (if probably dead before delivery, how long before ?)	
(10) Signs of death (Maceration ? Expressions such as "general signs" should not be used.)	

The undersigned doctor, who { was / was not } present at the birth of the above-mentioned child, has examined the body and has found the certain and unmistakable signs of death alluded to above.

....

....

(Name and address of the doctor to be given clearly.)

DENMARK. Form H.

B. DEATH CERTIFICATE issued by a doctor.

(This form may not be used for children under 1 year of age or for suicides or accidents. See Act, May 4th, 1875.)

(1) Full name (for married, widowed, abandoned or divorced woman also maiden name). Unmarried, married, widower, widow.	
(2) Date of birth and birthplace.	Date and year of birth. Birthplace.
(3) Status and occupation (of the deceased or of husband, parents or persons with whom the deceased was living. State if in charitable institution. For illegitimate children the name and occupation of mother to be given.)	
(4) Last permanent address.	*Town:* Street, street number, floor. *Country:* Village, parish.
(5) Date of death and age at death.	Date of death. Age.
(6) Place of death (if died in hospital or clinic state this).	*Town:* Street, street number, floor. *Country:* Village, parish.
(7) Cause of death and chief complications.	*(a)* If the deceased was treated by the undersigned doctor : *(b)* » » another doctor : *(c)* » died without medical care :
(8) Duration of the disease.	
(9) Signs of death (clearly described ; expressions such as " general signs " may not be used).	

The undersigned doctor who (date) .... has examined the body of (name of the deceased) .... has found the above-mentioned certain and unmistakable signs of death.

....

(Name and address of the doctor to be given clearly.)

Recorded in the parish register of .... Date : ....

Date of burial : ....

DENMARK.

Form I.

REPORT concerning stillborn child, at whose delivery the undersigned midwife assisted.

(1) Day, month and year of birth.	
(2) When did the labour start ? When did the mid-wife arrive ? When was the delivery complete ?	
(3) Was the child legitimate or illegitimate.	
(4) Name of mother and, if the child was legitimate, also name of father.	
(5) Age of mother.	
(6) *a.* Permanent address of the mother ? *b.* Where did the delivery take place ?	
(7) Boy or girl ?	
(8) Was the child fully developed or, if prematurely born, by how many weeks ?	
(9) Was it a normal headbirth ? If not, in what way was the birth abnormal ?	
(10) Was the child naturally born or with artificial help ?	
(11) Were there signs of decomposition ?	
(12) Did the midwife use any remedy in order to revive the child ? If not, why not ?	
(13) Probable cause of death ?	

Name of midwife : ....

Addre s : ....

DENMARK.

Form K.

DEATH CERTIFICATE

issued by coroners.

Note that the certificate should end with *a written declaration* as follows : "The undersigned declare herewith that they have examined the body of.............................. and found certain and unmistakable signs of death, viz. :

Full name :

Age (*i. e.*, : number of completed years ; for children under 1 year of age, months or weeks) :

Unmarried, married, widower, widow :

Occupation of the deceased or of the parents :

Address : **Parish :** **Town :**

Place of death :

Date of death :

Cause of death :

Name and address of the doctor who last treated the deceased :

Answers to questions concerning the signs of death :

(1) **Is there a cadaverous smell ?**

(2) **Is there rigor mortis ?**

(3) **Are the eyes fixed ?**

(4) **Are there cadaverous spots ?**

(5) **Is the hypogastrium green ?**

(6) **Are there signs of advanced decomposition ?**

Date :

....

Coroner.

....

Coroner.

Country parishes. **for the week from Sunday .... to Saturday .... inclusive.**

	0-1 year.	1-5 years.	5-15 years.	15-65 years.		Over 65 years.		Total.	Number transferred to hospital.	*Note :* If not previously notified by means of blank (No. 5), state here where the cases under heads 1 and 3 occurred (in the country: parish, village, farm; in towns: street and street number).
				Males.	Females.	Males.	Females.			
1. a. Febris typhoidea										
b. » paratyphoidea										
2. Meningitis cerebrospin. epidem.										
3. Diphtheria (incl. Croup)										
4. Scarlatina										
5. Morbilli										
6. Tussis convulsiva										
7. Angina parotidea										
8. Erysipelas										
9. Febris puerperalis										
10. Tetanus (Trismus) neonatorum.........										
11. Pemphigus neonatorum										
12. Febris intermittens (Malaria) (a) genuina ... (b) artificialis. .										
13. Febris rheumatica (a) First attack .... (b) Relapses.										
14. Pneumonia crouposa										
15. Tuberculosis pulmonum et laryngis ...										
16. Tracheo-Bronchitis										
17. Bronchopneum. et Bronchit. capill.										
18. Influenza										
19. Angina tonsillaris										
20. Cholerine & Catarrh. intest. acut.										
21.										
22.										
23.										
Total										
24. Gonorrhœa										
25. Ulcus venereum										
26. Syphilis acqvisit. (e coit. imp.)										
27. Syphilis (acqvisit.) insons										
28. Syphilis congetina										
29. Scabies										
30. Delirium tremens										

Note. 1. The blank lines are reserved for other possible diseases, which may become subject to official supervision.

2. Febris puerperalis includes all (even slight) inflammations occurring after the birth in or about the organs of reproduction.

3. In case of Pemphigus neonatorum, state name and address of midwife assisting at birth.

I hereby certify than in my practice I have observed the provisions of section 7 of the Act of March 30th, 1906, against public immorality and venereal infection.

In pursuance of § 6 of the same Act .... persons were charged to appear.

Name :

Address :

DENMARK. Form M.

FORM FOR NOTIFYING CASES OF INFECTIOUS DISEASE

(according to the Infectious Disease Act of May 10th, 1915) or for notifying cases of puerperal fever.

---

1. *Name* of patient :

   Age :

   Occupation :

   Address :

   (For towns : street and street number ; for the country : parish, village, farm or house.)

2. *Name* of the *disease :* and its *character :* (if marked, abortive, mild).

3. Probable *cause* and *duration* of disease :

4. *Have measures been arranged or taken to prevent the spreading of infection ?* Has the patient been transferred to hospital ? If so, where ?

5. Are there children in the house who attend school or some other institution ? (Not be answered in case of puerperal fever.)

6. Other information :

Name of the doctor : ....

Date : ....

And his address : ....

Note : This form should also be used when the board of health, or the competent district or epidemics medical officer requires special notification of other infectious diseases. (Act, § 24, 3.)

In cases of puerperal fever, the date of confinement and the name and address of the midwife should be given.

In case of smallpox in children under 7 years of age, state whether the child was vaccinated and its age when vaccinated.

If the patient is transferred to hospital, state on the application whether the case has been notified to the medical officer.

ICELAND.

1. This country presents highly interesting features for the student of vital atistics. The population is uncommonly homogeneous, mostly descendants of the iginal *Norwegian settlers* who came to the island in the year 874 and later. Pre-ously only a few Celtic hermits had found their way thither over the sea. The pulation, isolated as it was, developed and maintained a high standard of civili-tion, with their own language and their own independent literature. Tradition ing very strong, vital statistics are in many respects better developed than in ost other countries, in spite of the difficulties which are always encountered in a ountry with so scattered a population.

To Iceland belongs the distinction of being the *first Scandinavian country* in hich a general national census was taken : that was in the year 1703 [1]. It was rried out on the proposal of an Icelandic Commission, which inquired into the onomic condition of the country. The name, occupation and age of each indivi-ual were recorded ; paupers were registered separately, as also were persons tempo-rily present in the place concerned but having their homes elsewhere. The lists e going to be published and will form a most interesting basis for the study of e structure of the population two centuries ago.

Unfortunately, no real further progress was realised in the eighteenth century. numerations were taken in 1762, 1769 and 1785, but none of them had the value the census of 1703. In the nineteenth century, several censuses were taken at out the same time as in Denmark (1801 and 1834), and the results of these enumera-ons were published as a part of the Danish official statistics. In 1874 the Icelandic overnment began to publish statistical communications, and an Icelandic society Det Islandske Litterære Selskab), 1855-74, with public support, published yearly atistical reports in the Icelandic language. On January 1st, 1914, a statistical ureau was created to take charge of nearly all branches of statistics. Thus Icelandic ficial statistics were put on an independent and modern basis four years before e independence of Iceland was formally declared by agreement with Denmark n November 30th 1918.

2. The last decennial census was taken on December 1st, 1920, under the super-ision of the clergy, by unpaid enumerators who had to fill in a schedule for each ouse with details concerning each person living in the house at the moment of the nsus. This, however, is not the only source of knowledge with regard to the popu-tion. Every year the pastor prepares a table giving the number of persons residing each house or farm in his parish, distributed according to sex and a few age groups. *Reykjavik*, the capital of Iceland, with about 21,000 inhabitants — one-fifth

[1] Th. Thorsteinsson : *Den islandske Statistiks Omfang og Vilkaar* : Nordisk Statistisk Tid-rift, 1922.

of the whole population of the island—the police have charge of this yearly enumeration. Thus the whole system is reminiscent of that of Sweden, and it is said to work well, especially in the rural districts; in the towns the population according to the yearly enumerations will quite naturally be somewhat too small, but the results of the decennial census will probably be quite reliable.

The schedules used in the census of 1920 contained very much the same questions as those in the corresponding Danish census of 1921, but there are some interesting differences. Thus the Iceland schedule contains a question concerning the length of time infants below one year of age have been breast fed. Another question refers to the structure of the dwellings, whether they are made of turf, timber or brick. In the towns the census also supplied information concerning the dwellings (number of rooms, house rent, etc.).

Persons who have been at least six months without intermission in the same place are looked upon as residents, even if they have a domicile elsewhere. As in Denmark, persons who have settled in the parish are asked in what year this took place.

3. After having studied the structure of the population by means of the census, the next step is to follow the *movements* of the population through marriages, births, deaths and migrations. Here the chief part of the work is performed by the clergy. This is as a rule comparatively easy in spite of the frequently long distances between the dwellings, the average size of a parish in Iceland being very small (about 600 persons). Until the close of 1915 the pastors compiled the facts in a schematic form, but from the beginning of 1916 an individual report has to be made out for each marriage, birth or death which has taken place in the parish, and those certificates are sent quarterly to the statistical bureau where the data are compiled. On the *marriage* certificates there are details as to age, occupation, birthplace and domicile of the contracting parties; there is a question concerning the conjugal condition, whether it was the first or second marriage, etc., whether the wedding was civil, or if it took place in the church or in the home of the pastor; further, information is given concerning the occupation of the parents, the confession of bride and bridegroom and, finally, whether bride and bridegroom are related (first cousins, uncle and niece, or aunt and nephew). If a marriage takes place outside the parish where the bride is domiciled two certificates have to be filled out, one from each parish, the statistical bureau comparing the duplicates.

Birth certificates give the name of the child and day of christening; they state whether the child is born in or out of wedlock, the name, age and occupation of both parents, and also if the child was live-born or still-born; in case of multiple births, due reference is made to the birth certificates of the other children. Formerly, it was the rule that a child was christened very soon after birth. This is now not the case, baptisms often taking place long after birth; this may cause some difficulty. If a midwife has assisted at the birth she has to notify the birth within a week; if no midwife is present it is the duty of the parents, and the name of the child will

ıen be reported later. Sometimes the baptism takes place in another parish ; this another possible source of error, though probably not very important. In order avoid mistakes of this kind there are special certificates for such cases, as also for ases in which the christening has been delayed till a subsequent quarter of the year.

If a death occurs in a place where a physician is residing, the body must not e buried before a medical certificate of the death (in a closed envelope) has been rocured ; in other cases, the pastor has to obtain the best available information ith regard to the cause of death. The pastor sends the district physician yearly list of all burials in the preceding year with medical certificates of the deaths or, there be no medical certificate, with information as to the presumed cause of death. rom the district physician the reports are sent to the head physician, with remarks, nd from this officer they are transferred to the statistical office for the preparation f numerical tables. The medical certificate of death contains the usual particulars oncerning age, sex, occupation, etc., the place where the death took place and the omicile, as well as the principal cause of death, and other diseases from which he deceased had suffered. The certificate from the pastor contains corresponding articulars ; in the case of violent death the circumstances under which this occurred ave to be stated. The legitimacy or illegitimacy of children who die under five ears of age has to be stated. Here, also, the domicile and place of death are stated, s also if the burial took place outside the parish. In this way good statistical naterial is being obtained which in future will prove of great interest.

4. Icelandic vital statistics contain evidence of the peculiar conditions under hich the population lives. Formerly, rates of mortality were very high. Very often ears of scarcity caused great loss of human life, as, for example, in 1784-85 ; even n the past century the number of deaths frequently exceeded that of births. Thus n 1882 there were 3,259 deaths and 2,299 births ; in this year measles raged throughout he island. The infant mortality was on the whole very high in former times. In he middle of the century, about 30 per cent of new-born children died in the first ear of life. Later in life violent deaths were very frequent, especially among males. n 1850-60 the expectation of life for a newly born child was only 32 years for males nd 38 for females.

Later, a great change took place. By 1890-1901 the expectation of life had ncreased to 44 years for males and 51 for females. This enormous progress was in arge measure due to a decline in the infant mortality rate. In the years 1911-15, f 100 boys born alive, only 8.5 died in the first year of life ; for girls the figure vas 6.5. At other ages this decrease of mortality has also been very noteworthy. n the age period 1-4 years, the rate of mortality was reduced to one-third between 880 and 1910, and among adults the decline in mortality was about 30 per cent. This favourable movement does not seem yet to have come to a standstill. The xpected mortality in 1918-19 (years with a very high death rate in so many counries), according to the experience 1906-15, was considerably lower than the actual nortality, but in the following five years mortality has been on an average from

five to six per cent lower than expected. There seems all over the country to be a considerable improvement of hygienic conditions; the dwellings are becoming healthier, and medical assistance is more accessible. Infant mortality is now lower in Iceland than in Denmark, whereas later in life mortality is considerably lower in Denmark. This latter fact is partly explained by the greater frequency of violent deaths in Iceland, especially among males (in 1919-22, 13 per cent of all deaths, compared with from two to three per cent in Denmark). Drownings are especially frequent. On the other hand, suicides are comparatively rare. Leprosy was formerly very common but is now fast disappearing, the total number of persons suffering from this disease being in 1920 0.7 per 1,000 of the population, against three per 1,000 in 1896.

No conspicuous decrease of the birth rate of the married part of the population has as yet been observed; illegitimate births, however, seem to be on the decline. Birth rates among married women in all classes of age are considerably higher than in Denmark. Thus the natural increase of the population has of late amounted to 12-13 per thousand. This explains the rapid growth of the population from about 85,000 in 1910 to 95,000 in 1920; in former days the natural increase was smaller.

The following table, which I owe to M. Thorsteinsson, the Director of Icelandic Official Statistics, will show the main features of the movement of fertility and mortality. Still-births are included in births as well as in deaths.

	Number of Births	Number of Deaths
1735–1744	15,226	12,978
1745–1754	15,521	12,670
1755–1764	13,646	17,391
1765–1774	16,684	12,997
1775–1784	13,838	17,656
1785–1794	12,956	15,894
1795–1804	18,257	13,691
1805–1814	13,615	12,165
1815–1824	14,656	11,645
1825–1834	23,048	17,161
1835–1844	20,718	18,801
1845–1854	22,922	16,545
1855–1864	26,427	22,309
1865–1874	24,388	20,913
1875–1884	23,546	18,915
1885–1894	22,599	14,876
1895–1904	23,666	13,809
1905–1914	23,332	13,690
1915–1924	25,561	13,983
Total	370,606	298,089

In the first 70 years the numbers of births and deaths were more or less equally alanced ; in the following 80 years there were about four deaths to five births ; nd in the last 40 years about three deaths for every five births. Still-births amount ɔ about three per cent of the total births ; figures for still-births from 1838 are vailable. The number of deaths under one year is also known from the same year nd show a most remarkable decrease from one-third of the live-born to from six o seven per cent in the last decade.

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Manntal ó Islandi, 1910, Reykjavik, 1921.

Heilbrigdisskýrslur, 1911-1920 ; Reykjavik.

Mannfjöldaskýrslur árin 1911-1915 ; Reykjavik, 1921.

Annex.

ICELAND. Form A.

House
Farm
REGISTRATION TABLE No. ....

for the population census December 1st, 1920.

Name of the farm .... in the parish of ....
» commune of ....
Street number of the house .... » district of ....
» town of ....

The farm (or the house) is constructed of ....

INSTRUCTIONS.

SUMMARY OF ALL PERSONS LIVING IN THE HOUSE OR FARM.

	Males and females.
Total persons recorded in the principal table	....
Total persons in the table for those temporarily absent ...	....
Total	....

....

(Signature of the census-taker.)

Form A *(continued)*.

PRINCIPAL TABLE.

POSITION OF DWELLING IN THE HOUSE.	REGISTRATION NUMBER OF THE FAMILY. Single persons are also counted as families, except lodgers. Lodgers should be marked with a X. Persons temporarily present should be marked with a "t".	FULL NAME Children not yet named should be marked as "boy" or "girl". Persons temporarily absent not to be recorded here but on the back of the form.	SEX.	DATE OF BIRTH.	FOR CHILDREN UNDER 1 YEAR OF AGE: How long breast fed ?	CIVIL CONDITION.	CONFESSION OR CONGREGATION.	BIRTHPLACE.	MOVED INTO THE PARISH: Year :	POSITION IN THE FAMILY. (husband, wife, child, relation, domestic, lodger.	OCCUPATION.	NAME AND STATUS OF THE EMPLOYER.	DEAF AND DUMB, BLIND, FEEBLE-MINDED, INSANE.	NOTES State here the address of persons temporarily present (marked "t" in col. 2). Any other remarks.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

SUPPLEMENTARY TABLE FOR PERSONS TEMPORARILY ABSENT.

(Headings the same as in principal table.)

Note : Certain details have been omitted in order to save space.

ICELAND. Form B.

DEATH CERTIFICATE.

1. Full name : ....

2. Age : .... years .... months .... days.

3. Civil condition : married, unmarried, widower, widow. Children under 1 year of age { legitimate / illegitimate

4. Occupation of the deceased or of his (her) parents : ....

5. Address : ....

6. Place of death : ....

7. Date of death : ....

8. Cause of death : No. Name

   (a) Principal cause ....

   (b) Other causes ....

....

Did you visit the patient on his death-bed ? ....

When was the last visit ? ....

Did you see the body ? ....

When ? ....

Certified to the best of my knowledge. Date ....

....

Doctor.

NORWAY.

1. The history of Norwegian vital statistics [1] in the eighteenth century has been mentioned in the introductory chapter. After the separation from Denmark in 1814, Norwegian statistics for a while came under the charge of the Department of Finance, Commerce and Customs, and for many years there was no separate tabulating office. In 1837, however, a statistical bureau was established, which was made more independent in 1875 under the designation of the Central Statistical Bureau. The latter institution soon acquired a very high rank among European bureaux of the kind, due in large measure to the efforts of A. N. Kiær, who for a long series of years (1867-1913) was at the head of Norwegian official statistics. Outside of his country he was known for several contributions to statistics, notably for his efforts to introduce " sampling " in official statistics, for example, in his treatment of invalidity and income.

Private statisticians have also done eminent work in Norway. Among these Eilert Sundt (1817-75) has a prominent place through several highly interesting works on vital and social statistics, of which may be quoted those on gipsies and tramps, on marriages, on mortality, etc.

After the separation from Denmark a census was taken in 1815, which was afterwards repeated every ten years till the New Year of 1876. In the towns the magistrates were in charge of the enumeration ; in the rural districts the work devolved upon the clergy with the assistance of the schoolmasters and the bailiffs. In contrast to the census of 1801 the lists were not nominative ; the totals for each parish or town were alone given, distributed according to sex, age, occupation and number of married people. The census of 1815 was taken on Sunday, April 30th, and the following days. The next census took place on the first Sunday of Advent 1825. That this moment was chosen is naturally explained by the wish to facilitate comparison with the reports on births, deaths and marriages in the ecclesiastical year. Only abstracts of the results were published, on account of the cost of publishing complete tables, though it would only have amounted to 1,200-1,500 Kroner. Although the lists were not nominative, they were more specialised than in 1815, with totals for each house. The schedules contained the distribution of the population in ten-year age groups for each sex separately. As to occupation, there were only 13 heads in the towns and 15 in the rural districts. Ten years later — in 1835 — a new census was taken. The lists were more specialised ; thus there was a distribution according to age and marital condition combined. Further, there were observations of blind, deaf and dumb persons, of lunatics, feeble-minded and lepers. It is worthy of mention that this census was combined with agricultural statistics.

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[1] A. N. Kiær : *The History and Development of Statistics in Norway* (Koren, 1. c. 1918).

The following enumeration did not differ much from that of 1835, but in 1865 . very important step forward was taken. Hitherto, tabular statements were sent › the Bureau for compilation. Thereafter, the raw material was sent to the Bureau, ith information concerning each individual embraced by the census. A similar stem was introduced with regard to the lists of the movements of the population, d by-and-by other fields of statistics were treated in the same way. The value of is centralisation is evident, and quite naturally the Bureau soon used individual rds in compiling the results of vital statistics. This was the case with the material f the next decennial census—that of January 3rd, 1876. On this occasion another hange was made. The previous census enumerated the persons who had their domi-ile in the place concerned. In 1876 it was resolved to count the persons who were resent at the moment of the census.

2. After a lapse of 15 years the population was enumerated in 1890, and from his time a census was regularly taken, at ten-yearly intervals, the last one being hat of December 1st, 1920, and following days, about which the following details re of interest. The local authorities were in charge of the census, with the assistance f numerous persons each with his own small district. The Norwegian census quite aturally has always taken great interest in seamen, and this was also the case in 920, the Customs officers being required to enumerate the crew on board ships in he harbour concerned. An interesting fact may be added here. In 1906 a civil register f the population was established in the capital and later in other places. Where uch registries existed they were charged with the enumeration of the population ; hus a double advantage was secured. On one side the experience of the staff elped to make the census more accurate, and on the other hand the census ren-lered good service as a control of the civil register. These registers will be referred o again later.

The schedules of this census present several features of great interest. Thus ach married woman was asked when she was married, how many children were born n the marriage and how many of them were still alive. Detailed questions were sked about occupation, whether the individual was employed (and by whom) or ndependent, and in the latter case if he employs others. With regard to abnormali-ies, a question was put as to when they were acquired ; in this question invalidity nd disease were also included. All Norwegians who had spent upwards of two ears in America were asked what year they left Norway and when they returned. urther, there were detailed questions concerning dwellings (number of rooms, etc.) nd the size of the household.

The Norwegian Statistical Bureau has always taken great care to secure the reatest possible accuracy ; thus an exhaustive revision has been undertaken of the ges which have been put down by persons above 90.

3. This accuracy will undoubtedly be much increased in the future by the aid of the *civil registers* mentioned above.

On the initiative of Mr. G. Amneus, who, in 1900, assumed charge of the municipal statistics of Christiania (Oslo), an Act was passed in 1905 authorising the establishment of civil registers, followed ten years later by another Act with much more detailed prescriptions. In accordance with the Act of 1905, the capital introduced a civil register, which came into existence after a local census in the New Year of 1906[1].

The Act of 1915 entitled municipalities to issue regulations according to which the inhabitants have to answer questions with regard to name, occupation, age, etc., and the year when they settled in the town. This, in fact, is equivalent to a regular yearly local census. Several registers of the same kind, as in Oslo, have been established, especially since 1915. But the full use of an institution of this kind necessitates its application to the whole country and, as a matter of fact, a bill is under preparation prescribing civil registers all over Norway.

The civil register of Oslo has served as a model for others, not only in Norway but also in Copenhagen. Every person who takes up residence in Oslo, for a short or long time, or who removes from it, as well as any person removing to another house within the city, has to report the fact to the registrar, with all necessary details concerning himself and the members of his household : great care is taken to make these reports as complete as possible, with particular reference to the special conditions in a capital where naturally many persons spend a longer or a shorter time to study or for some other purposes. As in Copenhagen, the register is specially designed to assist the administration of the taxes ; it also ensures the accuracy of lists of electors, etc., and is of value to the police, the Poor Board and the post offices, and for enlistment in military service, etc.

4. As to the *movements* of the population, the same system has prevailed as in the other Scandinavian countries, the material being supplied for the greater part by the clergy. But there is a tendency to change the system, so that all marriages, births and deaths have to be notified to a civil registrar [2].

Originally, as already stated, the observations extended over the ecclesiastical year, commencing with Advent, but from 1839 the calendar year came into use. Various headings were later on introduced into the church registers. Thus in 1897 the questions with regard to father and mother of illegitimate children were extended ; in 1907 observations were collected about marriages between the parents of children born out of wedlock. In 1897 observations regarding the occupation of bridegroom and bride were inscribed in the register. In 1915 an Act was passed concerning the birth register, the parents having to announce the birth within a month. Particulars with regard to previous births of the marriage and the year in which the wedding took place have also to be registered. Already in 1870 an attempt had been made to obtain observations of this kind, but it was left to the persons concerned whether or not they chose to answer the question.

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[1] Amneus : *Folkregistreringen i Norge.* Nordisk Statistisk Tidskrift, 2, 1923.
[2] Amneus : *Forslag til Civilstandsregistrering i Norge.* Nordisk Statistisk Tidskrift, 2, 1923.

The schedules to be filled out yearly by the clergy are very detailed. The lists :e nominal rolls with particulars as to address, etc. The list of births (for each sex ·parately) gives the date of birth, name, age, occupation and confession of the parents, :so nationality (particularly with regard to the Lapland and Finnish elements). .urther, it is asked whether the child is legitimate and, if so, how many children :ave been borne previously by the mother in the same marriage or in a preceding one (nd how many are still alive), and the year of marriage. Finally, there is a heading :r multiple births.

There is a special list for still-births, defined as usual as births without life after ıe 28th week of pregnancy.

In the lists of *deaths* there are corresponding items. Care is taken to ascertain ıe occupation of the deceased, or of the person who provided for him. There is a ead for marital condition and for legitimacy for children under five years. For ıildren and pe sons above 90, the day of birth (or christening) is given. The cause f death is given, and in case of violent deaths information as to how the death took lace and, further, for suicides the motive ; if the person concerned died away from is domicile, it is asked where he died, and if buried outside of his domicile, where ıe burial took place.

As to *marriages*, a number of details are likewise required, thus whether it is ıe first, second, third marriage, etc., whether bride or bridegroom has been divorced, here they were born, whether they are relatives, whether the wedding was a civil ne, the occupation of the fathers of the bride and bridegroom, and their own occupa- .ons and domiciles before marriage.

All these details will furnish good material for statistical investigations into nportant sociological problems ; the questions relating to the number of children ı marriage will act as a very good supplement to the results of the census of 1920 oncerning the fertility of existing marriages.

The lists of marriages and live births are sent directly to the Central Statistical ureau ; the lists of still-births and deaths are sent to the district physicians.

Moreover, the Ministry of Justice sends every quarter to the Bureau individual ards concerning *separations* and *divorces*, with details concerning the duration of ıe marriage and the number of children alive and, in case of a divorce, of the children ho are dead.

It will appear from what has been said that official vital statistics in Norway re very well organised. Among problems the study of which the Central Statistical ureau has in view may be mentioned *occupational mortality*. The Bureau has taken eculiar interest in this subject ; the material furnished by the census and the distri- ution of deaths according to occupation has been worked up by the present director r. GUNNAR JAHN for the years 1889-92 and 1901-10. Here, of course, various ifficulties have to be met in order to make the material as homogeneous as possible. n former years the Central Statistical Bureau was not directly in charge of the tatistics of the causes of death, this subject being consigned to the Health Depart- ıent, and investigations of this kind could therefore hardly be as complete as

the corresponding enquiries in England for example; but a change was made in 1925, the subject being brought within the range of activity of the Central Statistical Bureau.

5. The main features of the vital statistics in Norway are very similar to those of the neighbouring countries. The present marriage rates are not very high, about from six to seven per thousand yearly, and present no striking changes from one year to another. The birth rates are decreasing rapidly. At the close of the past century, there were about 30 live births yearly for each 1,000 persons; in 1901-10 the rate was 27, in the following decade 25, and in the years 1921-24 as low as 23. Out of 100 live births about seven were illegitimate. At the same time, the rate of mortality was reduced considerably, but the movement was not so rapid as the decline of the birth rate. At the close of the nineteenth century the rate of mortality was about 16 per thousand per annum, thus leaving a natural increase of 14 per thousand, corresponding to a doubling of the population in about 50 years. In the two following decades the rate of mortality went down to about 14 per thousand (though rising to 17 in the fatal year of influenza, 1918), and there was a surplus of 13 and 11 per thousand respectively. The 1921-24 mortality was further reduced to 12, the surplus being 11. In the years 1892-1924 the surplus of births over deaths was nearly one million, but the population did not increase in a corresponding measure. The transatlantic emigration took about 370,000 persons away from Norway, but on the other hand the census of 1920 showed that there were about 50,000 Norwegians who had returned from America. The emigration was particularly great at the beginning of this century, whereas during the war it was reduced to insignificant proportions.

As to mortality, the expectation of life in various periods is shown in the following table:

	Males			Females		
Age	1821-30	1871-80	1911-20	1821-30	1871-80	1911-20
0 year ..	45.0	48.3	55.6	48.0	51.3	58.7
5 years ..	53.9	54.1	56.7	56.0	56.3	59.1
20 » ..	42.5	43.1	44.9	44.5	45.4	47.2
40 » ..	28.3	29.7	31.6	29.8	31.1	33.0
60 » ..	15.2	15.6	17.0	15.8	16.7	17.8

It will be seen that there has been a very important gain of life, both sexes having at birth an expectation of life of 11 years more than about a century ago. Later in life the saving is less marked, it having been especially the infant mortality which has decreased; in 1841-50 infant mortality was about 12 per cent for both sexes, against seven in 1911-20. But even at later ages much progress has been effected, as shown in the following table, which gives the number of deaths per 1,000 at each age.

Age	Males			Females		
	1821-30	1871-80	1911-20	1821-30	1871-80	1911-20
0–10 years ...	31	26	13	28	23	11
0–30 » ...	8	9	10	6	7	7
0–50 » ...	12	11	9	11	10	8
0–70 » ...	38	34	29	34	29	24

These numbers testify to the relatively excellent health of the Norwegian popu-ation. Prospects of life are better than in most other countries of the world. As o the males, the frequency of deaths through accidents is rather high (especially hrough drowning), but in other respects conditions seem favourable.

The Norwegian *Health Department (det civile Medicinalvæsen)* formerly ublished separate official reports as a section of Norwegian official statistics. This ask has now been entrusted to the Central Statistical Bureau (1925), as remarked bove. The first report published by the Bureau will be that for the year 1922. The eports contain various interesting observations, on deaths as well as on epidemic iseases, tuberculosis, etc., and on the results of the fight against venereal diseases.

Leprosy has decreased very much. At the close of 1856 there were 2,858 lepers; n the year 1920 the number had been reduced to 235, most of whom were being reated in hospitals.

6. In some of the counties *(Fylker)* a proportionately large number of *Finns* nd *Laplanders* are to be found ; the number in 1920 was about 29,000. These inter-sting elements of the population will undoubtedly show characteristic statistical eatures, which are indeed reflected in the figures pertaining to the total population f various counties. Thus in *Finmarken*, where these elements are particularly umerous, the birth rate in 1921 was 30 per thousand, against 20 in Oslo and 24 in he kingdom as a whole, and the corresponding rates of mortality were respectively 6, 12 and 11.5. The rates of births and deaths in these parts of the kingdom thus orrespond to those of the whole population in former times.

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Annex.

NORWAY. Form A.

POPULATION CENSUS IN NORWAY.

December 1st, 1920.

(The Norwegian arms.)

Table I. Personal return No. ....

District of........................ Census area No. .... House (farm)
House and household list No. .... number .... Factory number ....

1. Full name : ....

2. Male [1] ; Female [1] : ....

3. Date of birth .... year ....

4. Birthplace .... State district or town in Norway or native country outside Norway.

5. *a.* Unmarried [1] ; Married [1] ; Widow [1] ; Separated [1] ; Divorced [1].

5. *b.* For married women : Date of marriage ....
Number of children born in the marriage ....
Number alive ....
(The information refers to the present marriage.)

6. Occupation (principal occupation, see Instructions : question 6) ....

7. (See Instructions : question 7) :

a. If working for others (as official, worker, etc.) :

For whom do you work ? ....

b. If working on your own account : Do you employ others (yes or no) ? ....

8. Subsidiary occupation (or source of income) ....
If there is no subsidiary income of importance, write "no".

9. For all persons mainly dependent on others :

[1] You may answer by clearly underlining the appropriate word.

Form A *(continued)*.

State clearly the principal occupation of the supporting person ....

Note : Children under 15 years of age and living at home are always deemed to be supported. Their own occupation should be stated as subsidiary occupation under the heading above.

10. *a.* Blind [1] ; Deaf and dumb [1] ; Insane [1] ; Feeble-minded [1] ; Crippled [1] ; Ill [1] ....
For all these the native parish should be stated ....

10. *b.* Is the blindness, deafness, etc., crippled condition or disease probably congenital or at what age did it occur : ....

11. Able to work [1] ; Working capacity substantially reduced [1] ; Quite incapable of work [1].

12. Citizen of what country : Norway [1] or ....

13. For all Norwegians who have been in America not less than 2 years :

In which year left Norway .... Year when returned home ....

14. Creed : The State church [1] or ....

15. Position in the household : Head of the family [1] ; Wife [1] ; Son [1] ; Daughter [1] ; Lodger : with full board [1], with partial board [1], without board [1] ; Visitor [1], etc. ....

16. *a.* Are you permanently resident in the house (yes or no) ? ....
If not, where is your residence ? ....

16. *b.* Were you in the house on the night of December 1st (yes or no) ?........................
If not, presumptive address ? ....

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[1] You may answer by clearly underlining the suitable word.

Male. **Live-born children registered in 192. . .** **Parish of. . . . . . .** **Country or town of. . . . . .**

Registration number (for those who are registered without a number, write 0.)	Date of birth. Year and month.	Date of birth. Day.	Name of child (Take care not to register the same child more than once.)	If twin or triplet give sex and registration number of the other children of the same birth.	Full name and status of parents (state carefully status and occupation).	Parents' address (name of district or town).	Year of birth of parents.	For persons not belonging to the State church: parents' confession.	For Laplanders, Finlanders and foreigners: nationality of parents.	Birth legitimate or illegitimate.	For legitimate births: number of children previously borne by the mother: (a) in the same marriage / (b) in an earlier marriage	Number of these alive / Number of these alive	Year of marriage.	NOTES. (e.g. birthplace of children registered without number, etc.)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
					Father						(a)			
					Mother						(b)			
					Father						(a)			
					Mother						(b)			
					Father						(a)			
					Mother						(b)			
					Father						(a)			
					Mother						(b)			
					Father						(a)			
					Mother						(b)			

NORWAY.

Form C.

Male. **Stillbirths registered in 192...** **Parish of.....** **District (town) of.....**

N.B. — Abortions and stillborn fœtus born before the end of the 28th week not to be registered.

Registration number (for those who are registered without a number, write 0).	Date of birth.		If twin or triplet give sex and registration number of the other children of the same birth.	Full name and status of parents (state carefully status and occupation).	Parents' address (name of district or town).	Year of birth of parents.	For persons not belonging to the State church: parents' confession.	For Laplanders, Finlanders and foreigners: nationality of parents.	Birth legitimate or illegitimate.	For legitimate births: number of children previously borne by the mother.		Year of marriage.	NOTES. (e.g. birthplace of children registered without number, etc.).
	Year and month.	Day.								(a) in the same marriage.	Number of these alive.		
										(b) in an earlier marriage.	Number of these alive.		
1	2	3	4	5	6	7	8	9	10	11	12	13	14

E. Deaths registered in 192 . . . Parish of . . . . . District (town) of . . . . .

Registration number (for those who are registered without number, write 0).	Date of death.		Full name and status of the deceased. (For widows with no independent work the means of support should be stated.) Give both the status and the occupation of the deceased. For persons who had stopped work state the previous occupation, adding the letter "p".	If unmarried, married, widow or divorced.	For married women, status of the husband; for children under 15 years of age and other persons privately maintained (including grown up daughters living at home), the status of the supporter.	For child born 5 years or less before the year of death, state whether leg. or illeg.	Year of birth.	For child born 5 years or less before the year of death: date of birth. For persons born 90 or more years before the year of death: date of birth or baptism.		Address (name of district or town.)	Cause of death. (For accidents and suicides, manner of death and, for suicides, the motive.)	For persons not belonging to the State church: their own or their parents' confession.	For Laplanders, Finlanders, and foreigners: nationality.	For persons dying away from home: place of death.	For persons buried away from home: place of burial.	Notes.
	Year and month.	Day.						Month.	Day.							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

ESTONIA, LATVIA AND LITHUANIA.

1. For an appreciation of the present position regarding statistical procedure i the new Baltic States, which came into existence as a result of the world war, it i necessary to take into account the statistics of the *Russian Empire*, of which thes States formed part [1]. The condition of official statistics in Russia was not ver favourable. A central statistical office was established in the course of the last century but it had only very small resources and very often it was obliged, for want of neces sary means, to let statistical material which had been collected remain untouche for a long time. The main activity of the office was confined to statistics of popu lation and agriculture. No general census was taken till 1897.

Before that time only very incomplete information concerning the populatio was available. For a while so-called revisions were made to serve as a substitute fo a census. They were chiefly of a fiscal character, only including the classes of popu lation which were liable to a head-tax and to military service, whereas the privilege classes were not registered. The last of these revisions was made in 1858. Subse quently, so-called family registers were kept, in order to record persons liable t military service ; these were based on the lists of the revision which were to be kep up-to-date regularly. Further estimates of population were made with the help o local authorities, but these figures were generally looked upon as very untrustworthy In 1916 and 1917 attempts were made to take a general enumeration for the purpos of food regulations ; these enumerations seem to have been used for no other purpose

Since the beginning of the 'eighties, however, several municipal censuses have bee taken in St. Petersburg (Leningrad) and Moscow on modern lines, based on schedule filled in by the individuals, with additional oral interrogation whenever the lov educational standard of the population made this necessary. It may be added that i 1881 an enumeration was taken in *Estonia* and in *Latvia* where, on the whole, th conditions of official statistics were more favourable.

For the census of 1897 it was a matter of considerable difficulty to find sufficientl qualified enumerators and there were many other difficulties. The general result of the census were not published till 1905. A new census to be taken at the close o 1915 was decided on, but this was prevented by the great war.

Information regarding the movements of the population was obtained almos entirely from the clergy. The priest had to register births, deaths and marriages, an to draw up regular reports with extracts from the church register. These report were sent to the provincial offices for compilation and from these to the central office The deaths were distributed according to sex and age ; the number of legitimat

[1] KAUFMANN : *The History and Development of the Official Russian Statistics* (Koren, *l.c.*, 1918)

and illegitimate births was given. The causes of deaths were not given, outside a few large communities.

The conditions under which the new States had to found their own statistical services were thus not very favourable, but they at once set to work, and very soon regular systems were evolved.

2. In *Estonia* a central statistical bureau began work on July 1st, 1921, and at once planned a general census; an act authorising this was passed in June 1922 and the census was taken at the close of that year. The census was looked upon as an important national event, and the central bureau succeeded in getting willing assistance all over the country. The census was based on individual schedules in the towns, filled in by the persons concerned under the control of census agents selected among school-teachers, officials in public service, etc. In the country the agents had to fill in the schedules.

The questions in the schedules were very comprehensive. Thus nationality, country of birth, language, religious and conjugal condition had to be stated. Women had to state the number of children borne, and the number still alive. A question was put regarding literacy and the school or schools attended: there were also detailed questions about occupation. Blindness and other infirmities were recorded. A separate schedule contained detailed questions with regard to the dwellings (number of rooms, waterpipes, W.C., central heating, etc.). The material was sent to the central office, where it was revised, and where the results were compiled with the assistance of all modern technical aid.

The census indicated a population of about 1.11 million with a rather large preponderance of women, there being 112 females for 100 males. This seems to have been partially due to the war. The balance between the two sexes is particularly disturbed about 80 years of age, and the difference can hardly be explained by the heavier normal mortality of males. In still other respects the figures are remarkable, testifying as they do to a rather marked decline in the birth rate; though the population in 1897 was smaller than in 1922, the number of children was higher; the difference was especially striking for children five years old. We have here the combined effect of the regular decrease of the birth rate and of the events of 1916-17. As to the reliability of the census of 1922, there is evidence that many difficulties have been overcome under which the census of 1897 suffered. Thus the age-distribution from year to year is more regular, the maxima presented by the round years of age being not so conspicuous in 1922 as they were 25 years before.

The structure of the population seems to be homogeneous, only a minority of the inhabitants being other than Estonian. Eighty-four per cent belong to the Lutheran church. Among the Estonians there are very few who are unable to read and write, but among the Russian elements near the frontiers there are proportionately many illiterates. Observations concerning invalidity were collected, including the number of persons deprived of one or two arms or legs; this is quite naturally most frequent among males.

3. As to the *movements* of the population, the same system still prevails as was prescribed in the days of the Russian Empire, the clergy in the country having to register births, deaths and marriages, whereas in most of the towns this work is done by the civil authorities. A reform of the system was made by the law of November 12th, 1925, introducing a civil register with records for each person living in Estonia. At the close of the year the Central Bureau in Reval (Tallin) and the municipal office in Narva receive a tabular statement from each parish or district, giving the total number of live-births and still-births in the course of the year and of the births registered, whether born in this or a preceding year, classified according to sex. The total number of deaths and marriages is also given. These reports serve as a control to the regular communication of the individual facts, each birth, death and marriage necessitating the completion of a schedule with a large number of questions. Thus as to *births*, it is asked whether the child is legitimate, illegitimate or a foundling; the number of births in the family; the name, age, nationality, confession and occupation of the parents, the date of their marriage; the date on which the birth took place, and when it was registered. Exhaustive facts are also given with regard to *marriages*, including the domicile before marriage, and the conjugal state of both bride and bridegroom. As to *deaths*, the place where the death took place, as well as the domicile of the deceased person, are both stated; for children the order in which they are born is reported. The cause of deaths is given as accurately as possible. If no physician attended the deceased person, the presumed cause is given. The questions with regard to occupation are very detailed. Individual cards with regard to *divorces* are sent to the central office from the tribunals. These contain details as to how long the couple had been married, how many children there were, what was the cause of the divorce and which of the parties applied for it.

Great care is also taken to keep track of the *displacements* of the population through emigration and immigration. On the whole it may be expected that an interesting statistical picture of the movements of the population will be the result of the efforts described. As yet the facts show a rather low birth rate (in 1922, twenty per mille; in 1923, nineteen; in 1924, eighteen per mille) whereas the rate of mortality was proportionately high (17, 15 and 15 respectively), leaving a rather small natural increase of population. The infant mortality rate is relatively unsatisfactory.

4. In *Latvia* energetic efforts to develop a rational system of vital statistics have been made. A statistical bureau was soon at work and a census was taken in June 1920, according to which there was a population of 1.6 million. Another census was taken in February 1925. The number of inhabitants according to this census was no less than 1.84 million. This large difference is explained by the considerable number of persons who returned from Russia and from other countries after the war. Latvia suffered very much from the war from 1915 to the end of 1919, a large area being entirely devastated during the fighting between the Russian and German armies,

and again later during the Bolshevik occupation and the campaign which led to the liberation of the country[1]. In the years 1919-23 about 182,000 refugees arrived from Russia, of which 11,000 had been soldiers in the Red Army and 14,000 had deserted from the Russian Army. Altogether 209,000 persons came from Russia and there was a considerable influx from Germany and other countries.

Quite apart from the complications arising from these large movements of population the statistical service in *Latvia* would have had, in any case, greater difficulties to surmount than in *Estonia*, as the population is much more mixed. In the eastern part of the Republic there are many Russians, in the southern districts Lithuanians, in Riga and in the towns of Courland there are many Germans, etc. The total number of Latvians in 1925 was only 1.35 million. With regard to confession there is a similar lack of uniformity ; thus, out of 100 persons 57 are Lutherans, 23 Roman Catholics, 9 belong to the Orthodox Greek Church and 5 are Jews. As in Estonia there is a large excess of females, 1,145 for every 1,000 males ; above 21 years of age the proportion is as high as 1,207.

The movements of the population afford evidence of its heterogeneity. The average birth rate in the Republic during 1922-24 was rather low, about 22 per mille, but in the eastern parts of the country, where the Russian elements are numerous, the birth rate in 1924 was 33 ; in the capital — Riga — it was 16 ; in the other parts of the Republic about 19. The general rate of mortality being 14-15 there was a considerable natural increase of the population, but in Riga the natural increase in 1924 was only 2 per thousand, in the eastern parts of the country 16, and in the remaining parts of the Republic 4 per thousand. The mortality in the first year of life in 1924 was about 10 per cent, but also here considerable differences appear. Thus the Jews had only 4 deaths among 100 newly-born children ; among Protestants 8 per cent died ; among the Greek Catholics 14 per cent. The number of illegitimate births is relatively small, only 6 per cent of the children being born out of wedlock ; for Jews only 2 per cent.

Naturally, *public health* during the years of war was very unsatisfactory ; typhus and other epidemic diseases raged. But during the last years sanitary conditions have improved very much though typhus is still not uncommon in the eastern frontier districts. In Riga there were in 1919 about 12,500 deaths ; of these 1,500 ascribed to capital punishment. In 1924 the corresponding number of deaths was only 4,555. As an inheritance from past centuries there are still in Latvia cases of leprosy but the number of lepers is fast decreasing ; the number at present approximates 200.

5. The *census* of 1925 is based on individual cards which contained a large number of questions. Females had to state how many children they had had and how many of these were still alive. There was a question as to literacy and for children between 6 and 16 years of age a question regarding school attendance and its duration. There

[1] Cazeneuve : *Organisation of the Public Health Service in Latvia*. League of Nations Health Organisation, Geneva, 1925.

were detailed questions as to language, confession, nationality and domicile; with regard to occupation the questions were very exhaustive.

Statistics of marriages, births and deaths are also based on individual cards. Public registers have been established but part of the material is supplied by the clergy. The certificate of *birth* which the registrar issues, contains information concerning the confession, nationality, occupation and domicile of the parents, their age, etc. There are questions about legitimate births, still-births, multiple births, and the number of children in the family.

As to marriages, the conjugal condition, confession, occupation, domicile, age, etc., of bride and bridegroom is given. On the certificate of *death* there are similar facts, and the presumed or actually observed cause of death is stated.

Every three months the registrar sends a report in which the number of births, deaths and marriages in each month is stated in a prescribed form; the births are distributed according to sex and legitimacy, separately for live-born and still-born children, and multiple births are recorded. The deaths are distributed according to sex and age. Finally, the number of marriages (especially marriages reported by the clergy) is reported. For the clergy nominative rolls of all the births in the parish are prescribed which give the name, nationality, legitimacy, date and place of birth of each entry. Corresponding lists for deaths and marriages are prescribed. Detailed certificates of births, deaths and marriages are issued by the Registrars.

6. In *Lithuania* also there have been most energetic efforts made to found a regular statistical service. A general census was taken on September 17th, 1923, according to which the population approximated 2,029,000. Care was taken to secure the greatest possible accuracy. With regard to nationality, the enumerators who were to assist the population with all the detailed questions were instructed not to influence the reply volunteered by the individual. To ensure the observance of these instructions the enumerator in the parish was accompanied by the mayor, who, being elected by the inhabitants, was looked upon with confidence as one of their own. The results indicated that 84 per cent were Lithuanians, 8 per cent Jews (chiefly in the towns, where this percentage was as high as 31), 3 per cent Poles, 2.5 per cent Russians, and only a very small minority belonged to other nationalities. As in Estonia the distribution of the population according to age demonstrates the devastations of the war. Thus, between 30 and 45 the number of females for each 100 males was 127, above 45 only 112, for all ages 110. In connection with the census efforts were made to count the number of victims of the war, 1914-18. There were special schedules for persons who had taken part in the war; relatives were asked to supply information concerning soldiers who had died or who were missing. This information included the name, place of birth, whether the person had served as an officer, private, medical officer, etc., in which army he had served, whether he died from disease or was killed on the battlefield, or had disappeared, or was wounded, or invalided. Altogether about 65,000 persons took part in the war, out of whom 17 per cent had died, and 29 per cent had been wounded.

7. As to the *movements* of the population, the clergy furnishes the statistical bureau ith material ; each marriage, birth and death is notified on a card. Birth notifica-ons give particulars concerning place and date of birth, date of baptism or circum-sion, sex, the mother's age, confession, nationality, occupation, the number of revious births, and the occupation of the father. As to *marriages*, questions are ut as to age, occupation, etc., with an additional question as to previous narriage of both bride and bridegroom.

For *death* reports the same form is used for still-births as for the deaths of persons orn alive. For children under 15 there is a question as to legitimacy, for adult ersons as to marital position. There are questions regarding the place of death, whether at home or in a hospital, whether the deceased was attended by a medical nan, and the cause of death ; the latter information is, naturally, still somewhat mperfect.

The abnormal conditions of the country during the war are reflected in the number f marriages, births and deaths. During the war the rate of marriage was very low, out after the war it rose to about 7-8 per thousand. The birth rate was very low luring the war, especially in 1917, whereas mortality was high, so that there was an xcess of deaths during 1915-19 of about 32,000, whereas in the following quinquen-nium the number of births exceeded that of deaths by no less than 93,000 ; the birth ate in 1923-24 was about 29, whereas the rate of mortality was only about 15. The nfant mortality rate seems to have decreased from about 21 per cent to 17 per cent of the new-born. The number of illegitimate children born is about 6 per cent of the total number of births.

The bureau of statistics tabulates data concerning *epidemic* diseases and the *causes of death* ; as already stated the latter statistics cannot be very complete. In about 30 per cent of the total deaths in 1924 the cause was unknown or at least imperfectly stated.

SONOR S. A. — GENEVA.

Standardisation of Sera, Serological Reactions and Biological Products:

REPORT ON THE INTERNATIONAL CONFERENCE ON THE STANDARDISATION OF SERA AND SEROLOGICAL TESTS, convened by the Health Committee of the League of Nations and held from December 12th to 14th, 1921, at the British Ministry of Health, London. (French and English texts.) (C. 533. M. 378. 1921. III.)	1/6	$0.30
REPORT ON THE SECOND INTERNATIONAL CONFERENCE ON THE STANDARDISATION OF SERA AND SEROLOGICAL TESTS, convened by the Health Committee of the League of Nations and held from November 20th-26th, 1922, at the Pasteur Institute, Paris	1/–	$0.25
REPORT ON SEROLOGICAL INVESTIGATIONS, presented to the Second International Conference on the Standardisation of Sera and Serological Tests held at the Pasteur Institute in Paris in November 1922	8/–	$2.—
REPORT ON THE EUROPEAN HEALTH CONFERENCE HELD AT WARSAW from March 20th-28th, 1922	1/6	$0.50
REPORT OF THE TECHNICAL CONFERENCE FOR CONSIDERATION OF CERTAIN METHODS OF BIOLOGICAL STANDARDISATION, Edinburgh, from July 19th-21st, 1923	4d.	$0.05
INVESTIGATIONS ON THE SERODIAGNOSIS OF SYPHILIS. Report of the Technical Laboratory Conference held at Copenhagen, November 19th to December 3rd, 1923. (Two Annexes.) (C. 5. M. 5. 1924. III. / C.H. 148.)	3/6	$0.80

Malaria:

MALARIA COMMISSION: REPORT ON ITS TOUR OF INVESTIGATION IN CERTAIN EUROPEAN COUNTRIES in 1924. (C.H. 273.)	6/9	$1.60
DEUX RAPPORTS SUR LE PALUDISME EN ASIE MINEURE, EN SYRIE ET EN PALESTINE présentés par le Docteur Ernest Basso (Smyrne) et le Docteur A. Bentmann, Conseiller médical de régence. (C.H. 275.) (In French only.)	6/9	$1.60
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Epidemiological Investigations:

A MEMORANDUM ON THE EPIDEMIOLOGY OF CHOLERA, by Major A. J. H. Russell, M.A., M.D., D.P.H., I.M.S., Director of Public Health, Madras Presidency, India, 1925. (C.H. 339.)	1/3	$0.30
LE FOYER ENDÉMIQUE DE CHOLÉRA DE ROSTOV-SUR-LE-DON. Etude épidémiologique par le professeur W. Barikine (Moscou) et le Docteur H. Cazeneuve (Genève). (C.H. 395.) (In French only.)	1/6	$0.40
THE PREVALENCE OF EPIDEMIC DISEASE AND PORT HEALTH ORGANISATION AND PROCEDURE IN THE FAR EAST. Report presented to the Health Committee of the League of Nations by F. Norman White. (C.H. 130.)	6/–	$1.40
REPORT ON AN INVESTIGATION INTO THE SANITARY CONDITIONS IN PERSIA, undertaken on behalf of the Health Committee of the League of Nations at the request of the Persian Government by John Gilmour, M.B., Ch.B., F.R.C.S. (Ed.). (C.H. 262.)	1/6	$0.40
RAPPORT D'ENSEMBLE RELATIF A LA CAMPAGNE DE VACCINATION EXÉCUTÉE EN GRÈCE au cours de l'année 1923 par le Docteur Aimé Gauthier, médecin principal de l'armée française, délégué de la Commission des épidémies de la Société des Nations. (C.H. 149.) (In French only.)	1/6	$0.40
THE PROPHYLAXIS OF DIPHTHERIA BY THE DETERMINATION OF SUSCEPTIBLES AND THEIR ACTIVE ARTIFICIAL IMMUNISATION IN THE UNITED STATES, by Dr. Louis van Boeckel, Director of the Laboratory of the Belgian Public Health Department	1/9	$0.40
ETUDE ÉPIDEMIOLOGIQUE SUR LA "LEISHMANIOSE VISCÉRALE" EN ESPAGNE, par le professeur C. Pittaluga. (C.H. 368.) (In French only.)	9d.	$0.20

Minutes of the Provisional Health Committee:

FIRST SESSION (Geneva, August 25th-29th, 1921.) (C. 40. M. 280. 1921. III.) (English and French texts.)	Out of print.	
SECOND SESSION (Paris, October 20th-22nd, 1921.) (C. 471. M. 346. 1921. III.) (English and French texts.)	Out of print.	
THIRD SESSION (Paris, May 11th-16th, 1922.) (C. 336. M. 217. 1922. III.) (English and French texts.)	2/–	$0.40
FOURTH SESSION (Geneva, August 11th-21st, 1922). (C. 555. M. 337. 1922. III.) (English and French texts.)	Out of print.	
FIFTH SESSION (Geneva, January 8th-13th, 1923.) (C. 27. M. 13. 1923. III.)	Out of print.	
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THE WORK OF THE HEALTH ORGANISATION OF THE LEAGUE, including the work of the Epidemic Commission; Report of the Second Committee to the Assembly. (A. 74. 1923. III.)	3d.	$0.05
REPORT ON THE WORK OF THE SIXTH SESSION. (A. 28. 1923. III.)	6d.	$0.05

Minutes of the Health Committee:

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LEAGUE OF NATIONS

HEALTH ORGANISATION

ATISTICAL HANDBOOKS SERIES: No. 7

THE OFFICIAL VITAL STATISTICS OF THE REPUBLIC OF PORTUGAL

GENEVA 1926

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Further Report on Tuberculosis and Sleeping-Sickness in Equatorial Africa, by the same. (C.H. 281.)	2/–	$0.50

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LEAGUE OF NATIONS

HEALTH ORGANISATION

STATISTICAL HANDBOOKS SERIES: No. 7

THE OFFICIAL VITAL STATISTICS OF THE REPUBLIC OF PORTUGAL

GENEVA 1926

Publications of the League of Nations

III. HEALTH

1926. III. 9.

PREFATORY NOTE.

The Health Section of the Secretariat of the League of Nations presents herewith the fifth volume of a series of handbooks on the vital statistics of various countries. In doing so, it wishes to express its gratitude and thanks for the generous help given by the Portuguese officials and others, with whom much consultation and correspondence was necessary by the authors of the text.

This handbook was prepared, on the invitation of the Health Section, by Dr. Major Greenwood and Major P. Granville Edge, of London, England, who are at present preparing also similar texts on several other countries. The Section appreciates the interest and care with which the authors performed their work and wishes to thank them most cordially.

HEALTH SECTION OF THE SECRETARIAT
OF THE LEAGUE OF NATIONS.

CONTENTS.

S. d. N. — 1.400 (F.) 1.550 (A.). 9/26 — Imp. Sonor.

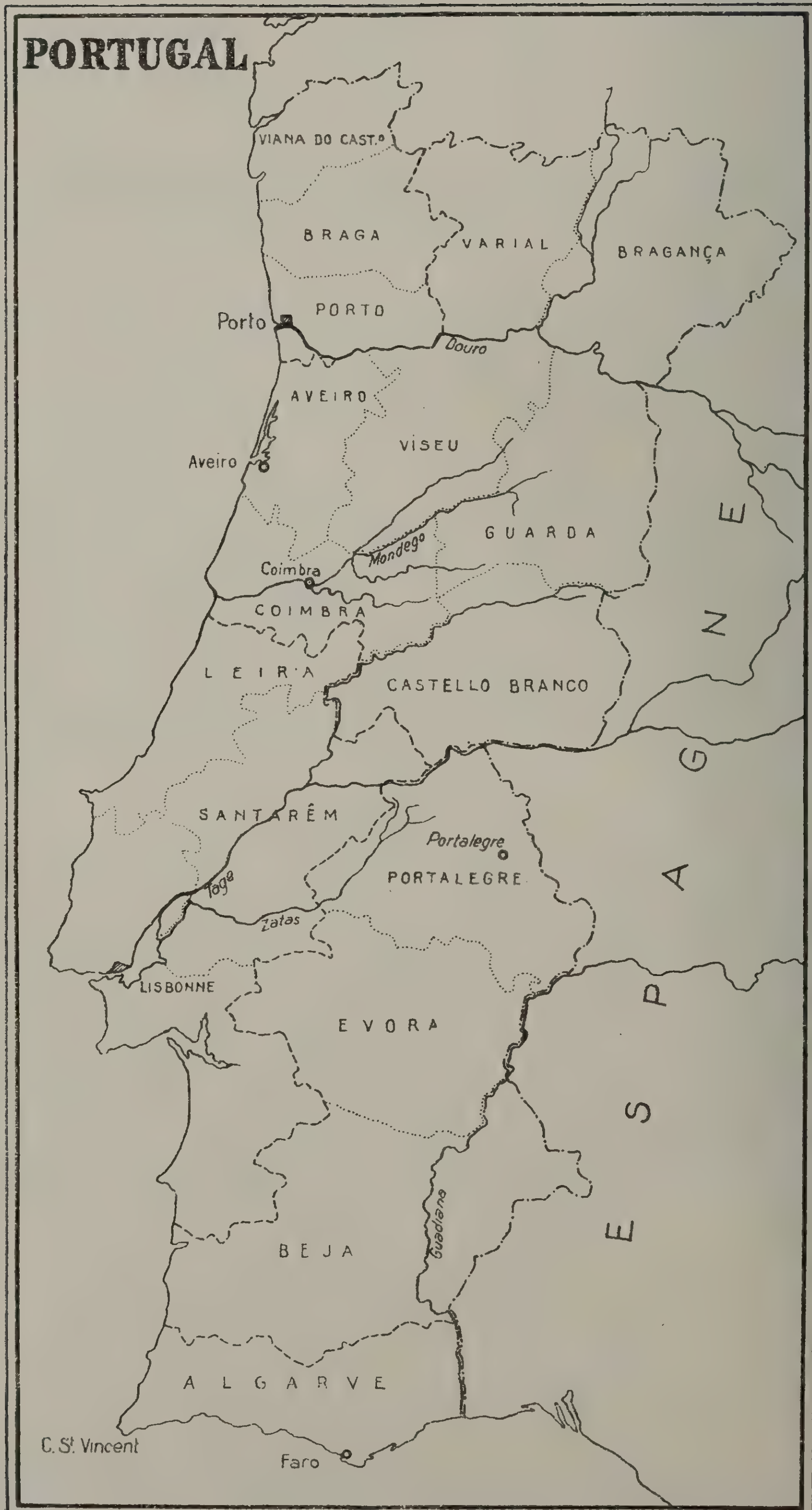
THE OFFICIAL VITAL STATISTICS OF THE REPUBLIC OF PORTUGAL.

I. INTRODUCTION.

The need for a ready and reliable source of detailed and descriptive information on the official vital statistics of the various countries has long been keenly felt by statisticians and public health officers. The difficulties which are at once encountered when data from two or more countries are assembled for comparative purposes are familiar to all. When the Health Committee of the League of Nations decided to collect and publish currently data on the prevalence of the chief communicable diseases, important questions arose concerning the comparability of the data. Subsequently, in organising its programme of statistical work, it was planned as a special activity to prepare a series of handbooks describing the official vital statistics of the various countries.

Therefore it is the purpose of these volumes to present a review of the existing practice and procedure in the collection and publication of statistics on population, births, deaths, and notifiable diseases, including not only methods of registration but also the current published reports. Effort has been made to include especially those facts the knowledge of which is important when comparisons are made of statistics from two or more countries. The statistics themselves are discussed chiefly with regard to the form and contents of the official reports on which they are presented.

It is realised that, even when meticulous care is exercised in preparing such handbooks as these, errors may not be entirely avoided, and the ultimate utility of the work can be judged best only by actual experience. Nevertheless, it is confidently hoped that they will prove useful and valuable as reference books on the details of method and procedure in the various national offices which collect and publish vital statistics.


PORTUGAL
VIANA DO CAST.º
BRAGA
VARIAL
BRAGANÇA
Porto
PORTO
Douro
AVEIRO
Aveiro
VISEU
GUARDA
Mondego
Coimbra
COIMBRA
LEIRIA
CASTELLO BRANCO
SANTARÊM
Portalegre
PORTALEGRE
Tage
Zatas
LISBONNE
EVORA
BEJA
Guadiana
ALGARVE
C. St. Vincent
Faro
ESPAGNE

2. PORTUGAL.

General Information.

Area.

Excluding the Azores and Madeira, which are officially regarded as parts of Continental Portugal, the area of the Republic is approximately 34,254 English square miles. Continental Portugal, together with the adjacent islands, has an area of 35,490 English square miles.

Population.

According to the results of the census of December 1st, 1920, the population numbered :

	Males	Females	Total
Continental	2,662,066	2,959,911	5,621,977
Islands	193,752	217,262	411,014
Total	2,855,818	3,177,173	6,032,991

Government.

Portugal has been an independent State since the twelfth century, and until October 5th, 1910, was an hereditary and constitutional monarchy. Following the revolution in October 1910, a Republic was proclaimed under a President, with the legislative power shared by an Upper and a Lower Chamber. In August 1911, a new Constitution was adopted, which provided for :

(a) A President elected by both Chambers in joint assembly ;

(b) A National Council of 164 members elected by direct suffrage for three years ;

(c) An Upper Chamber of 71 members, elected by the Municipal Councils, half of these members being required to retire every three years and new members elected to take their places ;

(d) The President to hold office for four years ; re-election to the Presidential office forbidden ;

(e) Provision for any necessary revision of the Constitution every ten years ;

(f) The President to appoint his Ministers, who are responsible to Parliament, the ministerial departments bring :

The Ministry of the Interior,
» » Foreign Affairs,
» » Finance,
» » Justice,
» » War,
» » Marine,
» » the Colonies,
» » Instruction,
» » Commerce,
» » Labour.

Local Government.

For administrative purposes the Republic is divided into 21 districts, 17 of these being on the mainland, three in the Azores, and Madeira one district. This partition of territory took place in 1833, when, under the terms of the law of June 28th of that year, the six ancient provinces, then comprising the kingdom, and generally conforming to the natural geographical divisions of the country, were, for purposes of administration, sub-divided into districts, each district taking its name from the chief town within its boundaries.

Each district is administered by a civil governor, nominated and appointed by the central authority. The district governor presides over a district commission of elected members *(Junta Geral da Distrito)*. This commission is answerable to the Central Government for the proper administration of civil affairs within the district. Each district is further sub-divided into *communes* and *parishes*.

The local affairs of each commune are administered by an elected council *(Camara Municipal)*, which is presided over by one of its own appointed members. The presiding communal authority is the nominee of the district governor, to whom he is directly responsible. These councils are autonomous under the Constitution.

Finally, each commune undergoes still further sub-division into parishes, which are administered by an elected parish council *(Junta de Paroquia)*.

Public Health Administration.

There is no separate Ministry of Health in Portugal. All officials of the General Health Department form part of the Ministry of Labour, the Director-General of Health *(Director-Geral de Saude)* being directly responsible to that Minister for the organisation and efficiency of the General Health Department of the Republic.

The principal laws providing for, and regulations governing, general health administration in Portugal are those of December 3rd, 1868, December 28th, 1899 (which also provided for the establishment of the Central Institute of Hygiene), December 22nd, 1900, and December 24th, 1901, the latter including provisions for the appointment of a General Health Direction (and administrative staff) responsible for the physical well-being of the people, the formulation of measures for the prevention and combating of infectious diseases, the collection and publication of demographic statistics, industrial hygiene and the publication of laws, regulations and information, etc., relating to public health.

The Department of Health has also the benefit of the advice and assistance of a specially appointed consultative body known as *O Conselho Superior de Hygiene Publica,* whose members comprise the Minister, the Director-General of Health, Professors of Medical Schools, etc., selected officials of the public health service, and other competent physicians.

The health regulations specifically enumerate the duties of the various responsible authorities, such as medical practitioners and officials of the public health services, administrative officials, magistrates, local authorities within their respective boundaries, and impose upon them the duty of ensuring that all health regulations are enforced. Briefly summarised, these duties include the following :

In the Districts (Distrito).

The Civil Governor (district) is responsible for the necessary financial measures to provide funds for the health services in the district ; he is required by virtue of his authority to assume responsibility for the fulfilment of sanitary measures, where these have been laid down by law, or recommended by the district medical officer *(Delegado de Saude)* in the exercise of his duties and according to existing health regulations ; he may require the demolition or repair of insanitary buildings or dwellings and is the sole authority for the issue of licences to workshops, factories, unhealthy trades, etc.

In the Communes (Concelho).

The administrative authority is responsible for all sanitary supervision and the enforcement of health regulations within the limits of the commune, and is required to bring to the notice of the communal medical officer of health *(Sub-Delegado de Saude)* any cases of infectious diseases of which it may become aware, and generally assist that officer in the performance of his duties ; provide the necessary funds requisite for health purposes ; maintain a strict observance of all legal requirements regarding registration of births, marriages and deaths within their local boundaries ; provide adequate disinfection services and isolation accommodation ; provide a water-supply both sufficient in quality and quantity to the needs of the population of the commune ; and, finally, to communicate to the Civil Governor of the district any exceptional occurrence affecting the public health.

In the Parish (Freguesia).

Parish magistrates and members of the parish council *(Junta de Paroquia* are required to assist the medical officer in the exercise of his duties and to advis that official immediately of any case of death ascribed to infectious disease, or of an case of infectious disease that comes to their notice ; advise the medical authorit of the occurrence of any disturbing factor relating to public health; enforce publi health regulations within their boundaries ; supervise all interments and exhuma tions, and require strict enforcement of all registration regulations within the limit of their area.

District Health Council.

The health regulations also provide for the formation of a council of health fo each district *(Junta Districtal de Hygiene)*, consisting of the district medical office of health, communal officers of health within the district, the district military medica officer, and the director or *former* doctor of the district civil hospital. This counci is convened either by the civil governor, or by the district medical officer to discus special sanitary problems relating to the district, and special and general measures i the interests of public health.

Lisbon and Oporto.

Special regulations are applicable to these cities, where the public health service have greater responsibilities and less limited freedom of action than in the areas w have already described. The public health services of these cities are administered b a director of health, assisted by medical officers of health and a director of disinfectio services. Lisbon is divided into 20 health areas, and Oporto into six, each area bein controlled by a medical officer directly responsible to the health director for the city In Lisbon are established the Government Institute of Bacteriology, the Nationa Laboratory and the Central Institute of Hygiene.

The Bacteriological Institute (Instituto Bacteriologico).

Its activities include the bacteriological examinations and analyses required i the public health services ; the study of the ætiology of infectious diseases, etc. the preparation and distribution of therapeutic and prophylactic sera and vaccine for use in the combat of special diseases such as diphtheria, tetanus, rabies, plagu typhoid fever, etc. ; and the special examination of the sputa of tuberculosis patient A diphtheria hospital has been established, and also a Pasteur Institute for th prophylactic treatment of rabies.

anitation at Ports and Frontiers.

A special section of the public health services is devoted to the organisation nd supervision of sanitary measures affecting ports and frontiers *(Articles 224 to 270 f the General Health Regulations)* and is especially concerned to prevent the introuction from abroad of all exotic infections, smallpox, typhoid fever, typhus fever, etc. 'hese measures include the examination of passengers, baggage, merchandise, etc., t the various stations, compulsory disinfection where necessary, quarantine, and eneral restriction of movement within the limits of an infected area. The captain f the port or frontier post and all subordinate officials are required to assist the anitary authorities in ensuring the strict enforcement of all health regulations nposed. The port and frontier sanitary authorities are further required to maintain tatistics of ships and their crews, passengers, baggage and merchandise and articulars of cases of infectious disease occurring within the area.

3. ESTABLISHMENT AND RESPONSIBILITY FOR STATISTICS.

We briefly refer later (see pages 14-22) to the various estimates of the populatio in Portugal made at different periods in the history of her national developmen Though numerous individual efforts were thus made, the formidable variatio in the results obtained have no dependable significance in the modern statistica sense, and the statistical history of Portugal cannot be said to date back beyond th first (modern) census of 1864, for particulars of which also see page 14.

A very definite step, providing for the establishment and responsibilities of statistical department, was taken by the promulgation of the General Health Regu lations of 1901. Under the terms of Articles 116 and 118 of those regulations, statistical department was created within the department of the Director-Genera of Public Health and accommodated in the Central Institute of Hygiene. Th statistical department is required to organise the national demographic and vit statistics; its duties include the study of fundamental processes and methods appl cable to statistical evaluation; the collection of all necessary statistical data; arrang ments for the enumeration of the population; the study of the movement population, with reference to births, marriages, deaths, *causes* of death, gener morbidity and the statistics of infectious diseases, and the publication of th tabulated results of national data.

The vital statistical data collected throughout the Republic, channels of tran mission, official schedules employed and the tabulations adopted in the officiall published literature are referred to in the pages hereafter.

4. THE CENSUS OF POPULATION.

GENERAL.

From Early Times to 1864.

Numerous estimates of the population of Portugal have been made at compara- vely frequent intervals from very early times, but, in the opinion of competent uthorities, the results of these estimates can only be regarded as providing approxi- nate figures; it would be unreasonable to expect accurate statistics of periods hich were distinguished by the disturbing influences of wars, pestilences, and ther disorders of a depopulating nature which such conditions produced.

In the year 1801, a Portuguese Minister, Dom Rodrigo de Souza Continho, nstituted an enquiry for the purpose of ascertaining the number of households and ersons in the Kingdom, the result being returned as 2,931,730. Other censuses ere taken in 1805, 1821, 1835, 1838, 1841, 1854, 1858 and 1861, but the history f modern census-taking in Portugal is always dated from the year 1864, the census f that year being invariably referred to in statistical literature as the *first* Portu- uese census.

From 1864 *to the Present Day.*

In May 1863, proposals were laid before the Portuguese Chamber of Deputies *(Camara de Deputados)* for the establishment of the general principle of decennial ensus-taking in Portugal. These proposals, although favourably received, were not finally approved before the end of the Parliamentary session; authority, however, vas obtained for an enumeration of the Portuguese population in the following ear. On the night of December 1st, 1864, this, the first Portuguese census, took lace, the results of that census being regarded as sufficiently reliable statistical ecords of the population of the country at that time. The census schedule of 1864 equired information regarding sex, age, civil state, occupation, place of birth and whether present at or absent from the place of habitual residence at the time of ensus.

The proposals laid before the Chamber of Deputies in 1863 were reconsidered y subsequent Parliaments, and the promoters of this bill were able to see their opes realised with the passing of the Law of March 15th, 1877, under which it was rovided that an enumeration of the population of Portugal should be made at egular decennial intervals, and that the next census (*i. e.*, the *second* Portuguese ensus) should be effected on January 1st, 1878.

At the second census, the individual bulletin was introduced *(Boletin de Famili*
and this schedule called for the following information regarding each pers
enumerated :

Surname and christian names.
Sex, age and civil state.
Relation to head of household.
Degree of instruction.
Infirmities, if any.
Occupation or social condition.
Character of dwelling.

Further amendments to the existing regulations were introduced under t
Law of August 25th, 1887, when the principle of decennial census-taking w
re-affirmed, but it was provided that, for the future, each census should be tak
in those years whose final digit was a zero ; this meant that the third census h
to be arranged for the year 1890. This was done, the actual census being tak
on the night of Nov. 30-Dec. 1st of that year, when the individual schedule require

Place of census, and whether person present or absent from habitu
residence at time of census.
Surname and christian names.
Age, sex, civil state.
Relation to head of household.
Place of birth, indicating for Portuguese persons whether born in Cont
nental Portugal or adjacent islands, living in commune where bo
or in another commune ; for foreigners, country of birth.
Instruction (able to read only ; read and write ; neither read nor write).
For children aged 6 to 12 years, whether attending school.
Religion.
Occupation or social condition.
Character of dwelling.

Other censuses have been taken in 1900, 1911 and 1920, but we would ca
attention to the following periods occurring between census dates :

January 1st, 1864 January 1st, 1878	14 years.
January 1st, 1878 December 1st, 1890	11 years 11 months.
December 1st, 1890 December 1st, 1900	10 years.

December 1st, 1900 December 1st, 1911	11 years.
December 1st, 1911 December 1st, 1920	9 years.

Procedure.

The promulgation of a Presidential Decree is the necessary preliminary which uthorises and provides for the enumeration of the population of Portugal, the ast Decree of this kind being that of March 2nd, providing for the sixth census f December 1st, 1920. This Decree is published in the official gazette, and also irculated to all administrative officials concerned throughout the Republic. Its arious clauses enumerate the responsibilities and duties of district, communal and arochial authorities in so far as census-taking is concerned, requiring each of these uthorities to proceed to the formation of special Census Committees in each local rea, and the sub-division of all areas into convenient census sections, each of which ·ill eventually be under the charge of a paid census agent. Each committee selects nd nominates the census agents for its particular area, these names being submitted ›r approval to the Director-General of Statistics at Lisbon. For the 1920 census, gents were appointed in the proportions of approximately one agent per 1,000 ıhabitants, but for the cities of Lisbon and Oporto each agent is responsible for not ıore than 150 *households*. Each agent is responsible for the distribution, collection nd verification of all schedules in his area, and his first duty is to make a survey f the area for the purpose of determining the numbers of household and individual ulletins he will require. For their services, census agents are paid for each person numerated by them.

About two weeks before the date fixed for the census, local agents proceed to istribute the necessary schedules within their respective areas, at the same time dvising where necessary, enjoining the desirability of accurate completion of the :hedules, and informing all concerned of the date upon which collection of completed chedules will be made. The schedules distributed are the following :

The Household Schedule *(Boletin de Fogos) :*
(First used 1890)

Names of persons comprising household.
Sex and civil state.
Nationality.
Uninhabited houses.
Degree of instruction of occupants.
Numbers resident in local area.
Numbers of individual schedules.

The Schedule of Vessels *(Boletin de Embarcacoes) :*
(First used 1890)

Numbers of ships at each port, distinguishing warshi and merchant ships, foreign ships.
Class and size of each vessel.
Name and number on register.
Nationality.
Name of captain or master.
Number of individual schedules distributed to crew.

The Individual Schedule *(Boletin de Familia) :*
(First used 1878)

The information required on this schedule has alrea been mentioned on page 14.

On the day following the census date, the agent is required to commence t collection of schedules, at the same time to scrutinise all schedules before leavi each household, and to cause corrections to be made where necessary, then to deliv all completed schedules to the local Census Committee under whose direction has been employed.

Transmission of Data.

District, communal and parochial Census Committees are required to exami all results received from the sections within the limits of their area, and, upon sati fying themselves that all returns are complete, these are forwarded to the offi of the Director-General of Statistics in Lisbon, where all schedules and results a tabulated, calculations made and final results published, under authority of t Ministry of Finance, by the Director-General of the Central Statistical Bureau.

Special Note.

Particular attention is directed to the remarks of the Director-General of Statistics wh preface the results of the census of 1920, for his comments indicate some of the difficult encountered in the enumeration of the Portuguese population and the direct effect these m have upon the accuracy of published results. Briefly summarised, these observations are :

That census agents have, almost on the eve of the census date, refused to carry o their duties at the rate of remuneration fixed.

That schedules have been delivered but not collected.

That the census has not been taken on the date fixed, and that this omission h involved an enumeration of particular localities at a later date by officials delegat by the Director-General. (Results were received from specified areas in 19 and 1923.)

Inefficient organisation by local committees.

Results of Census.

Official Publications containing Information regarding Population.

The information given below has been summarised from the census results of 1911, the information being published in four volumes as follows :

Volume 1.

This volume contains information regarding the number of households in the Republic, the numbers of resident population and populations *de fait* tabulated by sex, nationality, civil state, place of birth and degree of instruction for each district, province and commune, arranged as follows :

(a) A general commentary on the census results and movement of population by the Director-General of Statistics, this report being addressed to the Financial Minister of the Republic.

(b) The following information for each district of the Republic :

Number of communes in each district.
Number of parishes in each district.
Number of households in each district.
Total resident population in each district.
Total population present at the time of census in each district, tabulated with distinction as to sex, civil state, degree of instruction (illiterates and those able to read), nationality (whether Portuguese or foreign born).

(c) Exactly the same tabulation as in *(b)* above for each commune of the Republic.

(d) Similar information tabulated for principal parishes in each commune.

(e) The resident population afloat with distinction as to sex, civil state, nationality and degree of instruction.

(f) Number of foreigners present at the time of census tabulated for each district with distinction as to sex, civil state and degree of instruction. The total numbers are further tabulated according to the following nationalities :

Spaniards	French	Italian
Brazilians	German	Belgian
English	American	Other nationalities

(g) The same information as in *(f)* above tabulated for each commune

(*h*) Total number of families in each district of the Republic with indicatio of composition of those families, *i.e.*, whether 1, 2, 3, 4, 5, 6 or 7 o more persons in the family or household.

(*k*) The same information as in (*h*) above tabulated for each commune

(*l*) Total population, with no distinction as to sex at different periods with density of population per square kilometer. These figures ar available for the following periods :

1801	1854	1878
1821	1858	1890
1835	1861	1900
1838	1864	1911
1841		

With the exception of the years 1801 and 1821, these totals are give for each district of the Republic.

(*m*) Total population at each of the census periods 1890, 1900 and 191 for each district, with actual increases or decreases in population, an increases or decreases per cent ;

(*n*) Similar information for each district and commune, together wit density of population per square kilometer ;

(*o*) Population of the principal cities with no distinction as to sex ;

(*p*) Number of communes in each district, average population of eac commune at different periods and density of population per squar kilometer at the same periods ;

(*r*) Total number of parishes in each district, average population of each parish in each district, and average density of population of each parish ;

(*s*) Classification of parishes according to population ;

(*t*) Population with distinction as to sex for each district at each of the last census periods, indicating proportion of males to females in the population ;

(*u*) Population of each district tabulated according to nationality and place of birth, *i.e.*, whether born in the commune where enumerated, another commune of the same district, any other place, or foreign born ;

(*v*) Total number of foreigners present at the time of enumeration, tabu-lated according to district and nationality for each of the three last census periods ;

(*w*) Total population for each district tabulated according to civil state for each of the three last census enumerations ;

(*x*) Total population in each district at the three last census enumerations with distinction as to sex and further tabulated (*a*) illiterate, (*b*) able to read;

(*y*) Population of the principal European countries, with distinction as to sex, civil state, density of population.

Volume 2.

This volume contains a general survey by the Director-General of Statistics, together with the following tabular information :

(*a*) Total population present at the time of census, with distinction as to sex, civil state, degree of instruction and according to the following age groups :

0 to 1 year,
Each year of life to 14 years,
15 to 20 years,
Quinquennial age groups to 100 years,
100 or over,
Age unknown.

The above information is given for the whole of Continental Portugal and the adjacent islands ;

(*b*) Similar information for each district of the Republic ;

(*c*) Similar information for each commune ;

(*d*) Total number of children between the ages of 5 and 14 in cities of more than 10,000 inhabitants with distinction as to sex ;

(*e*) Total number of men over 20 years of age in each district, tabulated according to numbers of illiterates and of persons able to read ;

(*f*) Similar information for each commune ;

(*g*) Total population of three last census periods, tabulated according to quinquennial age groups 0 to 100 years ;

(*h*) Total population of three last census periods, tabulated for quinquennial age periods and with distinction as to sex ;

(*k*) Similar information to (*h*) above, with further tabulation by civil state ;

(*l*) Total population of three last census periods at quinquennial age groups, with indication of degree of instruction ;

(*m*) Total number of persons tabulated as suffering from the following infirmities :

Blind in one eye, totally blind, deaf and dumb, idiots, lunatics.

This information is tabulated for each district and for each commune, with distinction as to sex ;

(*n*) Similar information for the cities of Lisbon and Oporto and tabulated for each electoral ward of these cities.

Volume 3.

This volume deals in general with the population aged 80 years and over. Th Director-General of Statistics contributes a general survey concerning aged people o the Republic. The remainder of thei nformation in this volume is tabulated as follows

(a) Total number of persons aged 80 years and over in each district of th Republic at each of the three last census periods, with distinction a to sex;

(b) Total number of persons of 80 years and over in each district tabulate in the following age-groups, with distinction as to sex:

80 to 85	95 — 100	110 — 115
85 — 90	100 to 105	115 and over.
90 — 95	105 — 110	

(c) Similar information as (b) above for each commune;

(d) Similar information as (b) above for each parish.

Volume 4.

This volume has reference to the resident population classified according t the principal occupations, the tabulated information being:

(a) Total resident population tabulated with distinction as to sex at eac of the following age periods.

All ages Less than 20 years 20 to 40 years 40 to 60 years 60 years and over.	For those members of the populatio occupied.
Less than 14 years 14 years and over.	For persons without occupation.
All ages	Persons in domestic service.

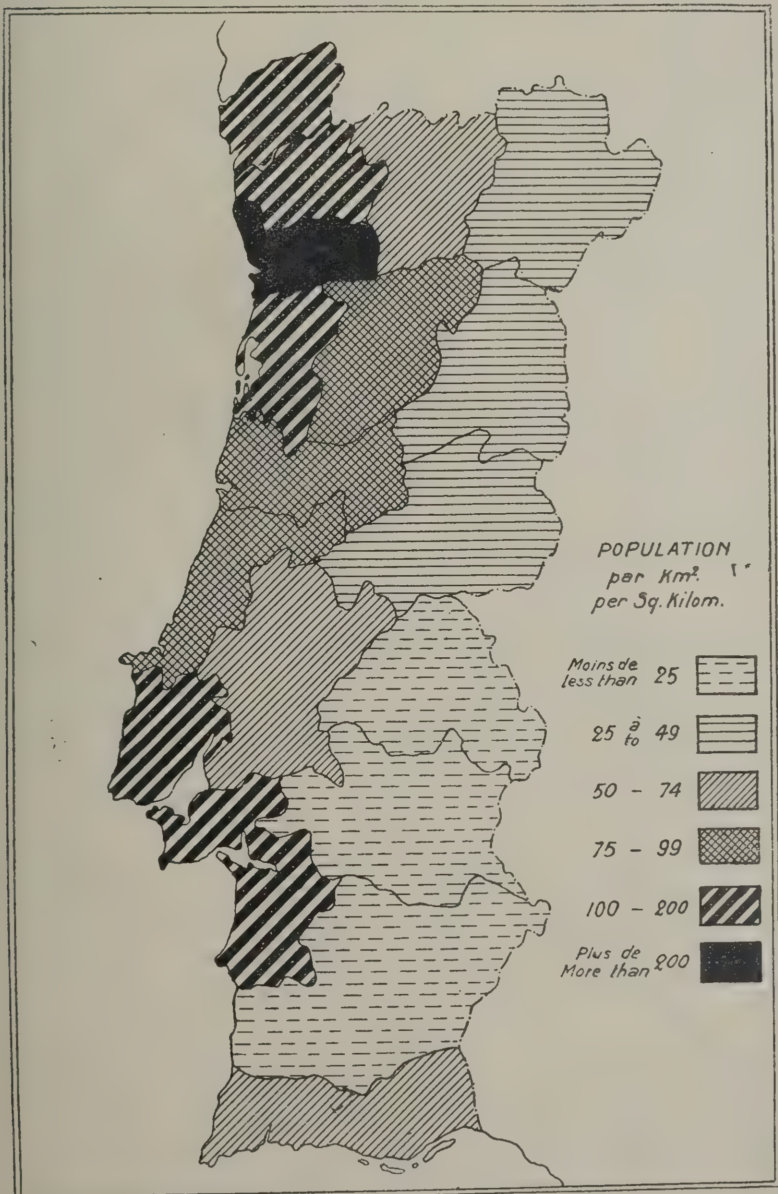
The whole of this information is further tabulated in 12 occupational groups namely:

Agriculture, Fisheries, Mining, Industrial, Transport, Commerce Public Works, Public Offices, Liberal Professions, Living upon incomes fron investments, In domestic service, Not occupied.

The Census of December 1st, 1920.

The first volume of the census results of 1920 has now been issued, its content conforming in all respects to those summarised on page 18, Volume 1, of the 191 census. We understand the remaining volumes will have their contents tabulated i a manner similar to that obtaining in Volumes 2, 3, and 4, described on pages 18-2 preceding.

Density of population in districts of the Republic, census 1920[1].



[1] This map is taken from "Censo da Populaçao de Portugal, 1920", Vol. I. The same volume contains also graphs illustrating :

(a) Population of each district according to the census results of 1890, 1900, 1911, 1920 ;
(b) Increase of population in each district according to census results ;
(c) Density of population in each district according to census results of 1890, 1900, 1911 and 1920 ;
(d) Density of each *commune* according to census results 1920 ;
(e) Population of each district according to sex, censuses of 1900, 1911, 1920 ;
(f) Population of each district according to origin, *e.g.*, native-born, etc., census 1920 ;
(g) Population of each district according to sex and civil state, census of 1920 ;
(h) Population of each district according to sex and degree of instruction, censuses of 1900, 1911, 1920.

Tabellas Preliminares do Movimento Fisiologico da População, 1902, 1903, 1904.

Calculated population for each year 1886 to 1904, for the Kingdom. The same for the cities of Lisbon and Oporto for each year 1895 to 1904.

Calculated population for each year 1902, 1903, 1904, for the Kingdom, with distinction as to sex.

Census population 1900, with distinction as to sex and in the following age groups :

0 to 11 months	10-yearly periods to 59 years
1 to 4 years	60 years and over
5 to 9 years	Age unknown.

Tabellas do Movimento Fisiologico da População, 1901-1910

Population at census periods 1900 and 1910, with distinction as to sex.

Calculated population for each year 1901 to 1910, with distinction as to sex.

Population for each year 1886 to 1900, with distinction as to sex and legitimacy.

Estatistica do Movimento Fisiologico da População de Portugal, 1913-1918.

Census population, with distinction as to sex, for the Republic and for each district.

Census population, with distinction as to sex and in age groups :

0 to 11 months	5 to 9 years, and by 5-yearly periods to 80 years
12 to 23 months	80 years and over
2 to 4 years	Age unknown.

5. REGISTRATION.

General.

Registration of births and marriages was entrusted to the clergy up to the time of the proclamation of the Republic and was made in each parish. The deaths were registered with the civil authorities. The registration among non-catholics was regulated by the civil registration law of 1886.

The form of the official records in use closely follows the systems practised in those countries which have adopted the fundamental principles of the Napoleonic Code in the matter of civil registration. In the early days of registration, the registers of births, marriages and deaths was in the charge of the ecclesiastical authorities, but, since 1900, all such official records have been maintained by and in the custody of the civil authorities.

It was not, however, until the passing of the Law of February 18th, 1911, that registration became generally compulsory, and failure to observe the registration regulations became a punishable offence against the State.

Monthly summaries of all inscriptions made during the current month are prepared and forwarded from all local areas to the Statistical Department of the Central Government. Further details regarding the registration of births and deaths, and the official schedules employed in these operations, are described in the succeeding pages.

6. THE REGISTRATION OF LIVE BIRTHS.

Under the Civil Registration Laws, all births occurring within the limits of Portuguese territory must be notified to the civil authority in charge of the registers of births, in order that inscription of such births may be made in the registers maintained for that purpose.

Procedure.

Declaration of the birth of a live-born child must be made within *one month* of the date of birth, at the office of the civil registrar of births in the communal area in which the birth occurred. Responsibility for the declaration of birth is imposed primarily upon the father of the child, or, in his absence or default, upon the mother, medical attendant, midwife or other person present at the birth, or the head of the household, or director of the institution or hospital in which the birth took place, the following information being at the time required of declarants :

Date of birth (day and month).

Hour of birth and domicile of the mother. If the birth occurred in a public institution, the name of such institution is required.

Sex and legitimacy of the child.

Names of both parents, age, and civil state.

Profession of both parents.

Number of children by the *same mother*, indicating sex, live-born and still-born, dead, still living.

Period of gestation.

Nature of obstetric aid, if any.

Whether simple or multiple birth.

The above information is submitted by the declarant, supported by two witnesses as required by the law. An *individual bulletin* is completed for each birth notified in the following terms :

Year.............

Book............. Folio............. Register No.............

CIVIL REGISTER OF PORTUGAL.

(Address of Civil Registration Office.)

Certificate of Birth.

On the........ day of.......... 19........ at....................... hours

....

in the Parish of ....

a child of the ....sex was born, to whom has been given the

name of ....

child of (Father) ....

and of (Mother) ....

and the birth is recorded in the Register of Births kept in this Registry Office.

Amount paid for fees, stamps, and stationery ....

(Name of Town) ....the ....

of .... 19.....

(Signed) ....

Registrar.

Inscription of the relevant facts of birth are then made in the *Register of Births* page of which is illustrated hereafter.

Book.................... Folio....................

REGISTER OF BIRTHS.

At .... hours and .... minutes of the .... day of the month of .... 192.... there was born .... in the Parish of .... in the District of .... a child of the .... sex, to whom has been given the name of .... Child of .... of .... years of age, Civil state .... Profession .... Native of ....
and of ....
of .... years of age, Civil State ....
Profession .... Native of ....
Domiciled at ....
....
Paternal grandchild of ....
and of ....
Maternal grandchild of ....
and of ....
Witnesses ....
....
....
....
The declaration of birth was made by ....
....
....
This inscription, after having been read over and compared with the extract, will be signed by me ....
....
....
The fees amount to .... escudos ....
and stamps to the value of 30 centavos are affixed to the extract ....
....
Civil Registry of ....
on the .... of .... 192.....

Certified copies of entries of births are supplied where required, upon payment of the prescribed fees to the registrar.

TRANSMISSION OF DATA.

At the end of each month, extracts of inscriptions of all births are prepared nd communal summaries compiled by the communal medical officers *(Sub-delegados de Saude)*. These summaries, which distinguish the sex and legitimacy of ll births, are forwarded to the district medical officer *(Delegate de Saude)*, in whose ffice a further summary is prepared from the schedules received from all communes omprised within the district. These district summaries, together with the communal ummaries and individual bulletins, are in their turn forwarded to the Statistical)epartment of the Department of Health at Lisbon, where they are tabulated for ublication in the form of national statistics.

The forms employed in the processes described above are illustrated herewith :

MONTHLY BULLETIN OF DEMOGRAPHIC STATISTICS

Central Institute of Hygiene

District ....
Commune..
Year 192 ....
Month ....

I. Births according to Legitimacy and Sex.

Live Births (a)																	
Legitimate			Illegitimate														
			Recognised							Parents unknown						Total	Grand total
			By Father		By Mother		By both Parent			Foundlings			Others				
M.	F.	Total	M.	F.	M.	F.	M.	F.		M.	F.		M.	F.			

(a) Include children born alive but dying before registration.

II. Births according to Nationality of Parents.

Live Births								
Father	Mother							Totals of Fathers
	Portuguese						Nationality unknown	
Portuguese								
Nationality unknown								
Totals of Mothers								

Live Births according to Districts, Communes, Parentage and Sex

Year 192........

District and Communes	Legitimate			Illegitimate													Total		
				Recognised						Not Recognised				Total					
				By Father		By Mother		By Both		Foundlings		Others					Sex		
	M.	F.	Total	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	Both	M.	F.	Both

In addition to the foregoing schedules, other official forms are provided for th monthly tabulation of births in the following manner :

Live births in hospitals, giving name of hospital, sex of children born legitimacy.

Live births in hospitals, with indication of nationality of each parent.

Live births, numbers of children born for each day of the month, wit indication of sex and legitimacy, total births from the beginning o the year, mean daily numbers, rate per 1,000 inhabitants.

Official Publications containing Information regarding Live Births.

Movimento da População.

Births for the Republic and adjacent islands and for each administrative distric in the Republic and for the cities of Lisbon and Oporto, tabulated with distinctio as to sex and legitimacy, absolute number of births in each classification, and totals

Total births in each district and commune of the Republic, tabulated by se and legitimacy.

Numbers of births in the Republic, each administrative district and the citie of Lisbon and Oporto, for each quarter of the year, with distinction as to sex.

Excess of births over deaths in the Republic as a whole, each administrativ district, and in the cities of Lisbon and Oporto, for the year under review and fou preceding years, absolute numbers and proportion of excess per 1,000 inhabitants

Graphical representation of births over a series of years, for the Republic an for each district.

Movimento Fisiologico da População de Portugal.

Numbers of births in the Republic and in each administrative district, with distinction as to sex and legitimacy.

Numbers of births in each administrative district and each commune, with distinction as to sex.

Numbers of births in the Republic and adjacent islands for each month of the year, with distinction as to sex and legitimacy.

Numbers of births in each administrative district for each month of the year with distinction as to sex and legitimacy.

Numbers of births in each administrative district and in the Republic, with distinction as to sex and legitimacy, and, in the case of illegitimate children, indication as to whether recognised by the father, the mother, both parents, or not known.

Number of births in the Republic, with indication of the nationality of each arent.

Number of births for each administrative district, with indication of the ationality of each parent.

n the same volume the following for the city of Lisbon:

Number of births for each month of the year, with distinction as to sex and gitimacy.

Numbers of births, with distinction as to sex and legitimacy, and, in the case f illegitimate children, indication as to whether recognised by the father, the mother, oth parents or not known, the above information being further tabulated for each ard of the city.

Number of births, with indication as to the nationality of each parent.

Number of births in hospitals, with the names of the several hospitals, disnction as to sex and legitimacy, and, in the case of illegitimate children, whether ecognised by the father, the mother, both parents or not known.

Number of births in hospitals, with indication of nationality of each parent.

he following information for the city of Oporto:

Number of births for each month of the year, with distinction as to sex and gitimacy.

Number of births, with distinction as to sex and legitimacy, and, in the case f illegitimate children, indication as to whether recognised by the father, the mother, oth parents or not known, the above information being further tabulated for each ard of the city.

Number of births, with indication as to the nationality of each parent.

Number of births in hospitals, with the name of the several hospitals, with istinction as to sex and legitimacy, and, in the case of illegitimate children, whether ecognised by the father, the mother, both parents, or not known.

Number of births in hospitals, with indication as to the nationality of each arent.

Boletin Mensal de Estatistica Demographico-Sanitaria.

(This monthly bulletin is published separately for each of the cities Lisbon an Oporto.)

Number of live births, with distinction as to sex and legitimacy, for each da of the month.

Number of live births, with distinction as to sex and legitimacy, for each war of the city.

Number of live births, with nationality of each parent.

Number of live births occurring in hospitals, with distinction as to sex an legitimacy and name of each hospital.

Number of live births occurring in hospitals, with nationality of each paren

Tabellas Preliminares do Movimento Physiologico da População, 1902, 1903, 190

Live-birth rate annually since 1886 for the country as a whole; live-birth rat since 1895 for the cities of Lisbon and Oporto.

Total numbers of live births for each year since 1886 for Continental Portug and the adjacent islands, with distinction as to sex and legitimacy.

Total numbers of live births for each of the years 1902, 1903 and 1904 for eac district of Continental Portugal and each district in the adjacent islands, with di tinction as to sex and legitimacy.

Tabellas do Movimento Fisiologico da População 1901-1910.

Total numbers of live births for each administrative district, with distinctio as to sex and legitimacy, for each year 1901 to 1910.

Total numbers of live births for Continental Portugal, the adjacent islands an the cities of Lisbon and Oporto, with distinction as to sex, for each month, eac year, 1901 to 1910.

Total live births and birth rates for each administrative district, for each yea 1901 to 1910.

Excess of births over deaths for each administrative district, for each yea 1901 to 1910.

7. THE REGISTRATION OF STILL-BIRTHS.

Procedure.

The procedure followed in the registration of a still-birth is similar to that lready described in the preceding chapter for the registration of live births. A pecial register is maintained for such inscriptions, and the following information ntered therein :

Date of registration.

Hour and place of birth ; if occurring in a public institution, the name of such institution is required.

Sex and legitimacy of the child.

Name, age and profession of both parents and domicile of the mother.

Number of children by the same mother, indicating sex, number born alive, still-born, since died, still alive.

Period of gestation.

Nature of obstetric aid.

Whether a simple or multiple birth.

Transmission of Data.

Monthly summaries of all still-births are forwarded by communal and district uthorities to the Statistical Department of the Department of Public Health at Lisbon, as described on page 27. The official schedules employed in this operation are reproduced overleaf.

CENTRAL INSTITUTE OF HYGIENE.

District ....
Commune ....
Year ....
Month ....

I. Births according to Legitimacy and Sex.

Still-Births (b)				
Legitimate.		Illegitimate.		Total
M.	F.	M.	F.	

(b) Include only those born dead.

II. Births according to Nationality of Parents.

Father	Mother.						
	Portuguese					Nationality unknown.	Total of Fathers.
Portuguese.							
Nationality unknown.							
Total of Mothers.							

Additional monthly schedules provide for the following tabulation of information regarding still-births :

Numbers of still-births, with indication of sex and legitimacy and period of gestation.

Numbers of still-births occurring in hospitals, with distinction of sex and legitimacy, and name of hospital.

Numbers of still-births occurring in hospitals, with distinction of sex and legitimacy and period of gestation.

Numbers of still-births occurring on each day of the month, with indication of sex and legitimacy, totals from the beginning of the year, mean daily numbers, rate per 1,000 inhabitants.

Official Publications containing Information regarding Still-Births.

Movimento da População.

Number of still-births for Continental Portugal, the adjacent islands, each administrative district and for the cities of Lisbon and Oporto, with distinction as to sex.

Number of still-births for each administrative district and each commune, with distinction as to sex.

Proportion of still-births per 1,000 inhabitants and per 1,000 births, for Continental Portugal, the adjacent islands, each administrative district and for the cities of Lisbon and Oporto.

Movimento Fisiologico da População de Portugal.

Number of still-births in Continental Portugal, the adjacent islands and for each administrative district, with distinction as to sex and legitimacy.

Number of still-births in each administrative district and in each commune, with distinction as to sex and legitimacy.

Number of still-births in Continental Portugal and the adjacent islands for each month of the year, with indication as to sex and legitimacy.

Number of still-births in each administrative district, for each month of the year, with distinction as to sex and legitimacy.

Number of still-births in Continental Portugal and the adjacent islands, with indication of the nationality of each parent.

Number of still-births in each administrative district, with indication of the nationality of each parent.

In the same volume the following information for the city of Lisbon :

Number of still-births for each month of the year, with distinction as to sex an legitimacy.

Number of still-births with distinction as to sex and legitimacy, tabulated fo each ward of the city.

Number of still-births, with distinction as to sex and legitimacy and period o gestation.

Number of still-births, with indication of the nationality of each parent.

Number of still-births in hospitals, with distinction as to sex, legitimacy an period of gestation.

In the same volume the following information for the city of Oporto :

Number of still-births, for each month of the year, with distinction as to sex an legitimacy.

Number of still-births, with distinction as to sex and legitimacy, tabulated fo each ward of the city.

Number of still-births, with distinction as to sex and legitimacy and period o gestation.

Number of still-births, with indication of the nationality of each parent.

Number of still-births in hospitals, with distinction as to sex, legitimacy an period of gestation.

Boletin Mensal de Estatistica Demografico-Sanitaria.

(This monthly bulletin is published separately for each of the cities Lisbon and Oporto.

Number of still-births, with distinction as to sex and legitimacy for each da of the month.

Number of still-births, with distinction as to sex and legitimacy, for each war of the city.

Number of still-births, with the nationality of parents.

Number of still-births, with distinction as to sex and legitimacy and period o gestation.

Number of still-births occurring in hospitals, with distinction as to sex and legitimacy and name of each hospital.

Number of still-births occurring in hospitals, with nationality of each parent.

Number of still-births in hospitals, with distinction as to sex and legitimacy an period of gestation.

Tabellas Preliminares do Movimento Physiologico da População, 1902, 1903, 1904.

Still-birth rate annually since 1886 for the country as a whole. Still-birth rate annually since 1895 for the cities of Lisbon and Oporto.

Total numbers of still-births for each year since 1886 for Continental Portugal for the adjacent islands, with distinction as to sex.

Tabellas do Movimento Fisiologico da População, 1901-1910.

Total numbers of still-births annually 1901-1910 for each administrative district, with distinction as to sex and legitimacy.

Total numbers of still-births for Continental Portugal, the adjacent islands, and for the cities of Lisbon and Oporto, with distinction as to sex, for each month of each year 1901-1910.

Total still-births and still-birth rates for each administrative district for each year 1901-1910.

8. THE REGISTRATION OF DEATHS.

Registration of deaths has been in force since 1886, and since 1911 such regi- tration has been compulsory. The Civil Registration Law relating to deaths an burial prescribes that no certificate nor authorisation for burial can be issued unt after the necessary record of death has been inscribed in the register of deaths. Thi regulation ensures that few deaths escape registration.

Procedure.

No specific time-limit is imposed regarding the period between occurrence (death and declaration, the law merely prescribing that declaration shall be mad " immediately ". In point of fact, little delay does actually occur, since intermer cannot take place without written authority, which is withheld until inscription (death has been made in the register.

Declaration must be made in person at the office of the registrar by the neare relative of the deceased or, in default of such person, by the head of the househol in which death took place, or by persons present at the time of death. Two witness are necessary to support the statements of the declarant of death.

Certification of Cause of Death.

The medical practitioner attending deceased during his last illness is requir by law to submit a certificate of death, upon which is recorded the fact of deat together with the primary and contributory causes of death. In the absence of a attendant medical practitioner during the last illness, the fact and probable cause death are verified by the local medical officer of health, or by a medical practition appointed to act in that capacity. The *medical certificate*, which is handed to tl family of the deceased, is in the following form :

District of ....
Commune of ....
Parish of ....

CERTIFICATE OF DEATH.

Name of deceased ....
....
legitimate or illegitimate child of ....
Aged .... Civil state ....
Profession ....
Native of ....
Permanent or temporary address in the commune ....
....
Living at ....
Day and hour of death ....
Vaccinated or not ....
Sanitary condition of dwelling ....
Duration of illness ....
Known or presumed cause of illness ....
....
Cause of death. { Principal disease ....
Contributory cause ....
Buried within the period ordained by law (If not — Reason ?) ....
....
Observations ....
....
Medical attendant ? or only for purposes of vertification of death ? ....
....
Day .... of .... 19 .....
Signed ....
Address ....

Permit issued by me to custodian of cemetery ....
the .... of .... 19....

.... Registrar.

On reverse side please see official nomenclature and observations.

(Reverse side of Certificate of Death.)

(This side contains both the Detailed and Abridged International Lists of Causes of Death 1909 and the following observations.)

Observations.

(a) Indicate cause of death by principal disease and primary cause and, where possible, contributory causes and complications which precede death. More especially in the case of infectious diseases, in the interests of medical statistics, please bear in mind these instructions, in cases of consumption terminating in hemorrhage, typhoid fever terminating in intestinal perforation, measles terminating in broncho-pneumonia. When two independent diseases are present at the same time, the cause of death should be ascribed to the more serious disease : but in the case where one of them belongs to the zymotic group, then this should be given the preference.

(b) In cases of poisoning indicate nature of poison.

(c) In cases of violent death, indicate form of accident, suicide, homicide or military execution.

The declarant and witnesses, having the necessary documentary evidence and the certificate of death, present themselves before the Registrar of Deaths, who prepares an *individual bulletin* of death in the case of each declaration :

Year ....

Book .... Folio .... Register No. ....

CIVIL REGISTER OF PORTUGAL.

(Address of Registration Office.)

Notification of Death.

On the ..... day of .... 19..... at .... hours

(Name) ....

of the parish of ....

died in this town of ....

Age .... years, Profession ....

Born at ....

Residing at ....

and child of ....

....

He is to be buried in the cemetery of ....
as is recorded in the inscription made in the register to-day in the Civil Registration Office.

The death was verified by Doctor ....

Amount paid in fees, stamps and stationery ....

(Name of Town) .... the .... of .... 19..

(Signed) ....

Registrar.

Inscription is then made in the *Register of Deaths*, a page of which is reproduc[ed]
herewith :

Book .... Folio ......

REGISTER OF DEATH.

At .... hours and .... minutes of the .... day of
the month of .... 192 .... at house numbered ....
....
in the Parish of .... District of ....
the death occurred of .... an individual of the
.... sex, name of ....
age .... Profession ....
Native of ....
....
Domiciled at ....
Child of ....
Civil state .... Profession ....
Native of ....
and of ....
Civil state .... Profession ....
Native of ....
Domiciled at ....
....

The deceased was ....
....
....

The deceased left .... children under age ....
property or estate, a will, and his body is interred in the cemetery of ....

The declaration of death was made by ....
....
....
....

After this record has been completed, read over and compared with the extract made
it will be signed by me ....
....

The fees amount to .... escudos ....

Civil Registry of ....

the .... of .... 19 .....

When required, and upon payment of the necessary fees, the following *certificate of death* may be issued to the family of the deceased :

THE CIVIL REGISTER OF THE REPUBLIC OF PORTUGAL.

CERTIFICATE OF DEATH.

Contents ....
.... of the Civil Register of ....

I CERTIFY that in the Registers of Deaths for the Year 19...... kept in this department under my charge there appears on page ..... the following entry :

In the margin : No. ....
....
....

In the text : At .... hours and .... minutes of
the day of .... of the month of .... of the year
one thousand nine hundred and .... in a
house in ....
of the Parish of .... district of ....
there died .... an individual of the
.... sex by name ....
of .... years of age, by profession ....
Counterfoil native of ....
Number domiciled in ....
...... child of ....
by profession..................... native of ....
and of ....
by profession..................... native of ....
domiciled in ....
The deceased was ....
....
The deceased (left or did not leave) ....
offspring under age .... property and a will, and
his body is to be interred in the cemetery of ....
The declaration of death was made by ....
....
....
After this record has been read and compared with the original inscription it will
be signed by ....
....
The amount of fees is ....
Department of the Civil Register on the ....
of .... 19 ......

This being the truth, the present certificate has been issued and signed by me ....
.... of .... 19 .....

The .... of the Civil Register.

Transmission of Data.

At monthly intervals, extracts of all inscriptions of death made during the mont are entered upon special schedules provided for the purpose, and forwarded by con munal medical officers *(Sub-delegados de Saude)* to district medical officers *(Delegad de Saude)*, who, from the total communal lists, prepare district summaries of a recorded deaths. These in their turn are forwarded to the Statistical Departmer of the Department of Health at Lisbon, where they are prepared for publication i the form of national statistics. The official schedules referred to above provide tl following information :

Numbers of deaths, with distinction as to sex, residents or visitors, whether di in hospital or at home address, numbers of deaths for each day of the month, tot deaths since the beginning of the year, mean daily numbers of deaths, mortalit rate per 1,000 inhabitants.

Numbers of deaths, with distinction as to sex, cause of death (Abridged Inte national List) and age, the age groups being :

0 to 11 months } Indicating legitimacy also
1 year to 23 months }
2 to 4 years
5 to 9 years
Five-yearly periods to 79 years
80 years and over
Age unknown.

Numbers of deaths of people aged 80 years and over, for each year 80 yea to 100 years, with distinction as to sex and cause of death.

Numbers of deaths with distinction as to sex and nationality.

For Lisbon and Oporto only :

Numbers of deaths, with distinction as to sex and cause of death, and war of the city in which living at time of death.

Numbers of deaths, with distinction as to sex, cause of death and age, the ag groups being :

0 to 31 days.	5 to 9 years
1 to 2 months,	Five-yearly periods to 79 years
3 to 5 »	80 and over
6 to 11 »	Age unknown.
Yearly 1 to 4 years.	Total deaths for each sex at each age.

Numbers of deaths at ages as above, with distinction as to sex, legitimacy an civil state.

Official Publications containing Information regarding Mortality.

Movimento da População.

Numbers of deaths in Continental Portugal and the adjacent islands, each administrative district, and in the cities of Lisbon and Oporto, with distinction as to sex; mortality rate per 1,000 persons for each of these areas, but without distinction as to sex.

Numbers of deaths in each administrative district and commune, with distinction as to sex.

Number of deaths in Continental Portugal and adjacent islands, each administrative district, and in the cities of Lisbon and Oporto, for each quarter of the year, with distinction as to sex.

Average number of deaths in Portugal, each administrative district and in the cities of Lisbon and Oporto, and average rate per 1,000 inhabitants in each of these areas over a series of years.

Graphical representation of deaths in Portugal and in each district over a series of years.

Movimento Fisiologico da População de Portugal.

Numbers of deaths in Continental Portugal, the adjacent islands, and in each administrative district, with distinction as to sex.

Number of deaths in each administrative district and commune, with distinction as to sex.

Number of deaths in Continental Portugal and the adjacent islands for each month of the year, with distinction as to sex.

Number of deaths in each administrative district for each month of the year, with distinction as to sex.

Number of deaths for Continental Portugal, the adjacent islands, and each administrative district, with distinction as to sex, and according to the following age groups:

0 to 11 months ⎫ Distinction as to legitimacy, 0 to 2 years.
1 year to 23 months ⎭
2 to 4 years
5 to 9 years
Thereafter by quinquennial age periods to 80 years
Age unknown.

Number of deaths by causes, with distinction as to sex, in each administrati district, deaths being tabulated according to the Abridged International List Causes of Death.

Number of deaths by causes, with distinction as to sex, for each administrati district and each commune, according to the Abridged International List of Caus of Death.

Number of deaths for Continental Portugal and the adjacent islands, with distin tion as to sex, according to the Abridged International List of Causes of Death, f each month of the year.

Number of deaths for each administrative district, with distinction as to se according to the Abridged International List of Causes of Death, for each month the year.

Number of deaths, with distinction as to age [1] and sex, for Continental Portug and the adjacent islands and according to the Abridged International List of Caus of Death.

Number of deaths, with distinction as to age and sex for each administrati district, and according to the Abridged International List of Causes of Death.

In the same volume, the following information for the Cities of Lisbon and Oporto:

Numbers of deaths for each month of the year, with distinction as to sex.

Numbers of deaths, with distinction as to sex, whether death occurred at residen of the deceased, or in a hospital, asylum, prison, etc., and tabulated for each war of the city.

Numbers of deaths, with distinction as to sex and legitimacy for children und nine years, and with distinction as to sex and civil state for those aged ten years an over. The above is further tabulated in the following age periods:

0 to 31 days
Monthly to 1 year
1 year, 2 years, 3 to 4 years, 5 to 9 years
Thereafter quinquennially [1] to 80 years.

Numbers of deaths for each ward of the city, with distinction as to sex, and death in institutions according to the Abridged International List of Causes of Death.

Numbers of deaths, with distinction as to sex, and according to the Abridge International List of Causes of Death, classified by the following age groups:

0 to 31 days
1 to 2 months
3 to 5 months
Yearly 1 to 4 years
5 to 9 years
Thereafter by quinquennial age periods to 80 years.

[1] For age periods employed, see page 43.

Numbers of deaths, with distinction as to sex, and according to the Detailed International List of Causes of Death, and the age periods mentioned above.

Numbers of deaths, with distinction as to sex, and according to the Abridged International List of Causes of Death, for each year of life from 80 years to 100 years, and over 100 years.

Numbers of deaths, with distinction as to sex, according to the Abridged International List of Causes of Death, for each month of the year.

Numbers of deaths from several causes, with distinction as to sex and nationality for Continental Portugal and adjacent islands. Numbers of deaths in the same table are given, with distinction as to sex and nationality and the following age groups, but no distinction as to *cause:*

0 to 4 years	40 to 59 years
5 to 14 years	60 and over
15 to 39 years	Age unknown.

Boletin Mensal de Estadistica Demografico-Sanitaria.

(This monthly bulletin is published for each of the cities of Lisbon and Oporto separately.)

Numbers of deaths, with distinction as to sex, for each day of the month.

Numbers of deaths, with distinction as to sex, for each ward of the city.

Numbers of deaths, with distinction as to sex, legitimacy, civil state and in the following age groups:

0 to 31 days	5 to 9 years
Monthly to 11 months	10 to 14 years
1 year	5-yearly age periods to 79 years
2 years	80 years and over
3 to 4 years	Age unknown.

Numbers of deaths, with distinction as to sex and cause (Abridged International List), for each day of the month.

Numbers of deaths, with distinction as to sex and cause (Abridged International List), for each ward of the city.

Numbers of deaths, distinguishing cause (Abridged International List), sex and age, the age groups being:

0 to 31 days	5 to 9 years
1 to 2 months	5-yearly periods to 79 years
3 to 5 months	80 years and over
6 to 11 months	Age unknown.
Yearly to 4 years	

Total deaths from January 1st, with distinction as to sex.

Numbers of deaths, for the Republic, Lisbon and Oporto, according to a speci list of 20 causes of death, with distinction as to sex, and indicating numbers foreigners whose deaths are ascribed to any of these causes. Total deaths, wi distinction as to sex, in the following age groups :

0 to 4 years	No indication of cause of death.
5 to 14 years	
15 to 39 years	
40 to 59 years	
60 and over	
Age unknown	

together with total deaths from January 1st, with distinction as to sex.

Numbers of deaths of persons aged 80 years and over, with distinction as sex, and a short list of causes of death.

Tabellas Preliminares Movimento Physiologico da População, 1902, 1903, 1904.

Mortality rates, for the country as a whole, for each year 1886 to 1904. Mortali rates for each year 1895 to 1904 for the cities of Lisbon and Oporto.

Total deaths, with distinction as to sex, for Continental Portugal and the adjace islands for each year 1886 to 1901.

Total deaths, with distinction as to sex, for Continental Portugal and the adjace islands, and for each administrative district, for each of the years 1902, 1903 and 190

Total deaths, with distinction as to sex, for Continental Portugal and the adjace islands and for each administrative district, according to the Abridged Internation List of Causes of Death.

Tabelas do Movimento Fisiologico da População, 1901 to 1910.

Total deaths with distinction as to sex, for Continental Portugal and the adj cent islands, annually 1886 to 1900.

Total deaths for each administrative district, with distinction as to sex and a for each year 1902 to 1910, the age groups being :

0 to 11 months	20 to 39 years
1 to 4 years	40 to 59 years
5 to 9 years	60 and over
10 to 19 years	Age unknown

Note. — The above information is also given for the cities of Lisbon and Oporto for the year 1901. Total deaths for other areas are given without distinction of age or sex.

Total deaths for each district, with distinction as to sex, and according to the Abridged International List of Causes of Death, annually 1902 to 1910, and for the cities of Lisbon and Oporto for 1901 to 1910.

Total deaths, with distinction as to sex, for Continental Portugal and the adjacent islands, and for the cities of Lisbon and Oporto for each month of the years 1901 to 1910.

Total deaths and mortality rates for each district for each year 1901 to 1910.

9. NOTIFICATION OF INFECTIOUS DISEASES.

Diseases Notifiable.

Under the Law of December 24th, 1901, the following diseases became compul-sorily notifiable throughout the country :

Typhoid fever
Typhus fever
Smallpox
Scarlet fever
Measles
Diphtheria
Leprosy
Tuberculosis
Cerebro-spinal meningitis
Whooping-cough
Rabies
Glanders,

while all cases, or *suspected cases*, of plague, yellow fever, cholera, and other exoti or infectious diseases, or epidemic outbreaks which might menace the public healt must be immediately notified. Provision is made under the law for the additio of other diseases not mentioned in the list quoted above, and, since the passin of the Law of 1910, influenza, encephalitis lethargica, poliomyelitis, Malta fever and pneumonia have also become compulsorily notifiable diseases.

Persons responsible for Notification.

Doctors, heads of households, directors or superintendents of public institution and schools, etc., are held responsible for the immediate notification of case of any of the above diseases, or of suspected cases, which may come to thei notice, and are required to make declaration of such without delay to the loca medical officer of health *(Sub-Delegado de Saude)*. Failure to comply with the regu-lations in force is a punishable offence.

Official Schedules used in Declaration.

Medical practitioners attending patients suffering from any of the compulsorily notifiable diseases are required to declare the occurrence of each case to the loca medical officer of health on the special form prescribed for this purpose, one of which is reproduced hereafter :

In accordance with the requirements of Article 60 of the General Health Regulations, I notify the occurrence of a case of *(a)* .....
....

Name of patient .... Age ....
Residence .... Parish of ....
Profession *(b)* .... Date of onset ....
Origin of infection ....
....
Requisition for disinfection has been made ? ....
Town .... the .... of .... 192...

(Signed) ....

(Signature of doctor) *(c)*

(a) The following diseases are compulsorily notifiable :

Typhoid fever, typhus fever, smallpox, scarlet fever, measles, diphtheria, tuberculosis, cerebro-spinal meningitis, whooping-cough, leprosy, rabies, glanders, plague, cholera, yellow fever, influenza, encephalitis lethargica, poliomyelitis, Malta fever, pneumonia.

(b) Profession of the parent in the case of a minor.

(c) Please sign legibly.

(Reverse side of above.)

TO : The Medical Officer of Health.

....

....

In all notified cases of meningitis, smallpox, typhoid fever, scarlet fever and diphtheria, the district medical officer *(Delegado de Saude)* requires confirmation of such cases, and to this end communal medical officers *(Sub-Delegado de Saude)* must complete and forward the following schedule to the senior official :

Name of patient.................................. Age ....

Profession.............................. Date of onset................

Whether treated at home or hospital.......................................

Name of medical attendant...

Whether premises have been disinfected....................................

Origin of infection...

Other information...

Duties of Medical Officer.

The communal medical officer is required to advise the district medical officer, the local administrative authority, and the communal chief of police, of all outbreaks of infectious disease, and of each case, or suspected case, of any of the exotic diseases occurring within the limits of the communal area. He is empowered to call upon the administrative authority to take such steps as he may think desirable to stamp out the disease and to prevent its spread, and generally see that all regulations relating to disease are strictly enforced by the local authority. He must superintend the removal of cases to isolation hospitals and quarantine stations, when such action is necessary, and have infected premises and articles of clothing disinfected. He must conduct an enquiry into the probable causes of the outbreak and trace, if possible, the sources of infection, reporting the result of his enquiry to the district medical officer at the same time indicating what measures he has recommended and adopted for the extermination of the outbreak.

Disinfection Services.

Each communal authority is required by law to provide adequate disinfection facilities to be held at the disposal of the communal medical officer, who orders and directs the disinfection of infected premises or articles of clothing, or of premises and articles of clothing *suspected* of contamination. Disinfection is compulsory in all cases where any of the following diseases occur :

Typhoid fever	Diphtheria
Typhus fever	Tuberculosis
Smallpox	Cerebro-spinal meningitis
Scarlet fever	Exotic diseases

Medical practitioners may make application for the disinfection of infected premises upon the following official form :

PUBLIC DISINFECTION SERVICES.

Telephone Number......

Medical Requisition.

(Here a list of diseases compulsorily notifiable)

Name of patient..

Address...................... Number............

Name of disease..

Number of rooms to be disinfected....................

Sent to hospital ?.............. When ?............

Died ?................. When ?.................

Disinfection recommended............................

....

Disinfection at public expense ?.......................

Town of................ Date.......... 192......

Signed...........................

(Doctor's signature.)

TO : The Officer in Charge of Public Disinfection Service,

Address...............................

Town...................................

Tuberculosis.

Special attention is to be devoted by the medical officer of health to this disease, and he is required to keep a list of all cases notified, and maintain a careful supervision of all such cases within the limits of his area; he must study the cause or causes of the disease and generally conform to the methods and recommendations of the national committees, such as the *Assistencia Nacional aos Tuberculosos* and *Ligas contra a Tuberculose*, in his efforts to combat the disease.

Vaccination.

Vaccination is compulsory in Portugal, and each communal medical officer is responsible for all vaccinations and re-vaccinations within his area, devoting at least one day in each week to this duty. He must make periodical visits to the various parishes of the commune, all such visits being previously announced. The lymph is furnished by two private institutions under Government control, one at Lisbon the other at Oporto.

Anti-Diphtheritic Serum.

Sufficient supplies must be maintained by the communal medical officer in accordance with the terms of the regulations relating to this subject, these supplies being obtained direct from the Bacteriological Institute at Lisbon.

Extermination of Rats and Mosquitos.

The communal medical officer must institute and maintain an active campaign for the extermination of these pests, paying special attention to this matter where wharves, docks and swampy ground exist.

Bacteriological Examinations.

Local sanitary authorities and individual medical officers of the public health services may submit specimens for examination to the National Bacteriological Institute *(Instituto Bacteriologico)* at Lisbon. This Institute, which has already been referred to on page 10 of this volume, co-operates with all officials of the public health service in the fight against infectious diseases. In Oporto, the Bacteriological Laboratory of Oporto *(O Laboratorio de Bacteriologia do Porto)* is an integral part of the special health service of that city devoted to the study and control of infectious diseases.

Transmission of Data.

In the larger cities and towns, a weekly summary of the numbers of cases of infectious disease is prepared after the following form :

DEPARTMENT OF HEALTH OF...............................

Cases of infectious disease for the.........., week of........... 192.........

Diphtheria................................Cases.
Scarlet fever ....Cases.
Typhoid fever ....Cases.
Typhus fever ....Cases.
Meningitis ....Cases.
Measles.....................................Cases.
Whooping-cough ....Cases.
Smallpox ....Cases.
etc.....

Vaccinations.

First Vaccinations..................................
Revaccinations ....
Total..........

Ordinarily, the individual notifications received by communal medical officers are retained, and a monthly summary prepared after the following plan and transmitted direct to the Central Statistical Bureau at Lisbon, where the data are utilised in the compilation of the national statistics.

Cases of Infectious Disease occurring, or Known, Month of .... 192...... (a)

Number	Commune	Parish	Disease	Name	Sex	Age	Profession	Date of onset.	Date and manner of termination	Observations (b)

(a) When indicating recovery or death, be good enough to state if any cases have already been reported, mentioning the communication in which such report was made.
(b) In cases of smallpox, mention whether patient was vaccinated and revaccinated..

Medical Officer of Health of the Commune of.................................. the .... of .... 192...... Medical Officer ....

10. CONCLUSION.

An examination of the figures of total deaths from all causes during the years 1911-1920 indicates a varying mortality rate, with an enormous increase in 1918, a feature which agrees with the experience of England and Wales, Holland, Spain and other countries during the same year, and which was doubtless due to the serious influenza epidemic of that year. The mortality rates for Portugal for each year 1911-1920 and the birth rates for the same years, are as follows :

	Mortality rates	*Birth rates*
1911	22.5	—
1912	19.9	—
1913	20.6	33.0
1914	19.4	—
1915	19.8	31.87
1916	20.8	31.11
1917	20.5	30.46
1918	40.2	28.79
1919	24.2	26.40
1920	25.54	32.12

Specific Causes of Death.

Tuberculosis, diseases of the heart and respiratory organs, cerebral hemorrhage, cancer, and diarrhœa and enteritis are, as elsewhere, principal causes of mortality. Mention must, however, be made of the very high proportion of deaths ascribed to *Senility*, and *Causes Unknown or ill-defined*, for, while this continues, confrontation of rates of mortality from such diseases as cancer is impossible. The significance of these figures will be better appreciated by examination of the rates for these causes and by comparison of the rates of mortality relating to the two countries, for example :

Mortality Rates, per 100,000 *living.*

Disease.	*England and Wales.*		*Portugal.*	
	1913.	1919.	1913.	1919.
Senility	82.5	80.9	—	114.4
Unknown or ill-defined......	7.5	102.6	856	1,097.8
Cancer	105.1	114.5	25.1	24.0
Scarlet fever.	5.6	3.3	1.0	0.8
Tuberculosis	136.0	125.7	124.0	137.4
Diphtheria..................	12.2	13.3	8.9	9.1

Infant Mortality.

The rate of infant mortality is high, as will be gathered from the following figures :

1913	....	159.6	per 1,000 live births.
1917	....	148.4	» » » »
1918	....	209.2	» » » »
1919	....	143.8	» » » »

The principal headings to which these deaths are assigned are diarrhœa and enteritis, congenital weakness and malformation, diseases of the respiratory system, meningitis, measles, diphtheria and croup, the rates per 100,000 inhabitants for these diseases being :

	1913.	1918.	1919.
Diarrhœa[1] and enteritis (under 2 years)	112.6	119.9	130.8
Congenital weakness, etc.	72.7	86.7	67.7
Respiratory diseases	30.8	34.6	—
Whooping-cough	8.0	5.0	4.6
Meningitis	6.9	6.5	5.7
Measles	3.1	1.5	0.4
Diphtheria........................	1.9	2.0	1.3

[1] With the exception of diarrhœa, all rates are for children under one year of age.

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PRINTED BY SONOR S. A. — GENEVA

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LEAGUE OF NATIONS

Health Organisation

ANNUAL REPORT

OF THE

HEALTH ORGANISATION

for 1925

FOREWORD

During its Fourth Session, held in Geneva in April 1925, the Health Committee of the League of Nations studied the methods of preparing and presenting an annual report which would provide an account of the activities of the Health Organisation in a more concise and connected manner than it has been possible to give in the various reports prepared for the Assembly, the Council and the Office international d'Hygiène publique. In accordance with a resolution subsequently approved by the Council, it was decided to publish such a report relating to the period ending December 31st of each year and intended for the use of Public Health Administrations and other organisations interested in international health questions.

The object of the report is defined by the terms of the resolution authorising its preparation and publication. Opportunity has thus been afforded to describe more clearly those activities envisaged by the resolutions of the Health Committee, to explain the circumstances in which each enquiry has been undertaken, to mark the different stages of development of these investigations, and to give a detailed appreciation of the progress effected during 1925. Finally, in certain cases, the programme of future work has been briefly outlined.

The present report being the first of this series, it has been thought advisable to commence the report for 1925 with an historical summary of the early activities of the Epidemic Commission and of the Provisional Health Committee.

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Chapter I.

HISTORY OF THE HEALTH ORGANISATION

Article 23, paragraph (*f*), of the Covenant of the League of Nations, which provides that Members of the League shall "take steps in matters of international concern for the prevention and control of disease", is the mandate of the Health Organisation.

To give effect to this provision of the Covenant, the Council, during its session of February 1920, decided to summon an International Conference of health experts to prepare the constitution of the Health Organisation. The Conference met in April 1920 and found itself faced not only with the problem of the constitution of an International Health Organisation but with the more immediate necessity of taking steps to restrict the spread of typhus and relapsing fever epidemics which, originating in Russia, were over-running the new countries of Eastern Europe. This immediate problem was met by the appointment of a temporary Epidemic Commission of three members, the recommendation of the International Conference to this effect being adopted by the Council in May 1920.

THE EPIDEMIC COMMISSION

When first the voluntary contributions of States Members of the League became available for the Epidemic Commission the problem was rather to promote international co-operation than to direct anti-epidemic measures. The work of the Commission consisted of attempts to aid the affected countries to work out a co-operative programme so that a united front might be presented to a common enemy.

In the first years of its existence the Epidemic Commission was able to strengthen the defence of the chain of countries in Europe which were threatened by epidemics from the East. This was done by acting as an organ of co-operation, by furnishing material aid where most needed by establishing relations with the authorities in Russia, and by systematising and co-ordinating the whole system of defences and securing joint action on the part of the public health administrations of countries on the eastern border of Europe. The chief work of the Epidemic Commission in co-operation with the countries most concerned consisted in :

(*a*) The organisation of quarantine stations.
(*b*) The equipment of hospitals.
(*c*) The application of measures for cleansing and disinsecting.
(*d*) Securing and distributing supplies of food, clothing, soap, vehicles for motor transport and other like necessities.
(*e*) Securing accurate information in regard to the epidemic situation in Russia.

The work of the Epidemic Commission in Poland and other countries of Eastern Europe continued until 1923. In the meantime its members were called upon to assist in the solution of other problems, notably the epidemics of smallpox, cholera and enteric fever among the Greek refugees who poured into Greece following the war in Asia Minor. A vaccination campaign was inaugurated, some eighty Greek physicians, medical students and health inspectors were organised, and about 550,000 refugees were inoculated against the three prevalent diseases.

Bound up with the work of the Epidemic Commission was the International Health Conference of Warsaw held in March 1922 and including delegates from 27 States. The conference was called by the Polish Government for the purpose of finding some solution to the crushing problem of dealing with the hordes of refugees who poured into the border States of Russia. Two of the recommendations of this conference bore immediate fruit:

(1) Effect was given to the recommendation that the public health services of Russia be strengthened by organising courses for the training of medical officers of health in the prevention of epidemics.

(2) The proposal that a series of sanitary conventions be negotiated between the countries of Eastern Europe was also realised by the conclusion of a number of such agreements.

The proposal of the Conference for a health campaign in Eastern Europe on a large scale under the auspices of the Health Committee was not fully carried out because of the difficulty of obtaining the necessary funds.

While the Epidemic Commission was dealing with these emergencies, the Provisional Health Committee had been organised. The members were appointed by the Council of the League, and many were also members of the Office international d'hygiène publique at Paris. In May 1923,

a committee consisting of the members of the Provisional Health Committee and of the Permanent Committee of the Office international d'hygiène publique prepared a draft constitution of the Health Organisation, which was adopted by the Fourth Assembly.

WORK OF THE PROVISIONAL HEALTH COMMITTEE

The work of the Provisional Health Committee did not differ materially from that of its successor. Many of the problems now being studied by the Health Committee were initiated by the Provisional Committee. In fact, the organisation of the Permanent Health Committee served as a means of placing the work of the Provisional Committee on an established basis. The Provisional Health Committee began the Service of Epidemiological Intelligence and Public Health Statistics, the co-ordination of scientific research, the system of interchanges of public health personnel, and the cancer, malaria, anthrax and other enquiries.

THE PRESENT HEALTH ORGANISATION OF THE LEAGUE OF NATIONS

The present Health Organisation consists of three parts:

1. The Advisory Council, constituted by the Permanent Committee of the Office international d'hygiène publique at Paris.
2. The Health Committee, consisting of twenty members.
3. The Health Section, forming an integral part of the Secretariat of the League of Nations.

The Permanent Committee of the Office international d'hygiène publique, which is composed of representatives of 43 States, meets twice a year, its sessions following those of the Health Committee within an interval of a few days. The printed resolutions of the Health Committee are transmitted to it in the form of a report, which is placed on its agenda, and the members of the Permanent Committee deliberate on the work of the Health Committee as defined in these resolutions with a view to giving advisory opinions. The resolutions of the Health Committee must be submitted to and approved by the Council before they are effective, and advisory opinions are secured from the Permanent Committee of the Office international d'hygiène publique before the Council acts on them. The Council of the League may also request the Office international d'hygiène publique for advice on technical health questions, as in the case of the Opium Convention of 1925, when an opinion was asked on the advisability of bringing within the scope of the Convention two new preparations which have habit-forming properties.

The Health Committee is composed of twenty members elected as follows : the President of the Permanent Committee of the Office international d'hygiène publique is *ex officio* a vice-president of the Health Committee, and nine members are elected by the Office international. The Council selects six members and may appoint four assessors in consultation with the Health Committee. Each member of the Health Committee serves for a period of three years, and as all the present members were elected simultaneously, their terms expire at the end of 1926. The Bureau of the Health Committee, which consists of the President, the three vice-presidents and the Medical Director of the Health Section, who also acts as Secretary of the Committee, may meet in the intervals between the sessions of the Health Committee and take decisions on certain questions of pressing importance. Such decisions of the Bureau are subject to review by the Health Committee.

The Health Committee directs the health work of the League and is responsible for the technical direction of the Health Section. It meets twice a year, usually in April and October, and reports to the Council and to the Assembly on its work. A member of the Council acts as Rapporteur on the Health Organisation. The French member of the Council was the first Rapporteur on the Health Organisation. The present Rapporteur is Viscount Ishii, of Japan. The technical work of the Health Organisation is reviewed by the Second Committee of the Assembly, which appoints one of its members to report on this subject to the Assembly. The budget of the Health Organisation is prepared by the Bureau, approved by the Health Committee and reviewed by the Fourth Committee of the Assembly.

The membership of the present Health Committee, together with the technical experts co-opted by the various commissions, is as follows:

Members of the Permanent Health Committee.

President:	Professor Th. MADSEN, Director of the National Institute of Serotherapy of Copenhagen.
Vice-Presidents:	M. O. VELGHE, Secretary-General of the Ministry of the Interior and of Health, Brussels.
	Dr. Carlos CHAGAS, Director of the Oswaldo Cruz Institute of Rio de Janeiro, Director-General of the Health Service of Brazil.
	Dr. N. M. Josephus JITTA, President of the Health Council of the Netherlands, The Hague.

Members:

Professor Léon BERNARD, Professor of Hygiene at the Faculty of Medicine of the University of Paris.
Sir George BUCHANAN, Senior Medical Officer of the Ministry of Health, London.
Professor J. CANTACUZÈNE, Professor of Experimental Medicine at the University of Bucarest, and Director of the Serum-Vaccine Institute.
Dr. H. CARRIÈRE, Director of the Swiss Federal Health Service, Berne.
Dr. W. CHODZKO, late Minister of Health for Poland, Director of the School of Public Health, Warsaw.
Surgeon-General H. S. CUMMING, Chief of the United States Public Health Service, Washington.
Dr. A. GRANVILLE, late President of the Sanitary, Maritime and Quarantine Council of Alexandria.
Dr. Alice HAMILTON, Professor of Industrial Hygiene at the Harvard Medical School, Boston.
Professor Ricardo JORGE, Director-General of Public Health, Lisbon.
Dr. A. LUTRARIO, late Director-General of the Public Health Administration at the Ministry of the Interior, Rome.
Dr. P. MIMBELA, Professor of Bacteriology at the University at Lima, Peru.
Professor B. NOCHT, Director of the Institute for Tropical Diseases, Hamburg.
Professor Donato OTTOLENGHI, Professor of Hygiene at the Royal University of Bologna.
Professor Gustavo PITTALUGA, Professor of Parasitology at the Faculty of Medicine, Madrid.
Dr. L. RAYNAUD, Inspector-General of the Health Services of Algeria, Algiers.
Dr. M. TSURUMI, representing the Sanitary Services of Japan, late Director of the Health Service of the South Manchurian Railway Company.

Commissions of the Health Committee.

1. *Public Health Training Commission.*

President: Professor Léon BERNARD.

Members:
Professor CANTACUZENE.
Dr. CHODZKO.
Professor Ricardo JORGE.
Professor MADSEN.
Professor OTTOLENGHI.

Experts:
Dr. Andrew BALFOUR, Director of the School of Hygiene and Tropical Medicine, London.
Dr. Alfred GROTJAHN, Professor of Social Hygiene, University of Berlin.
Sir George NEWMAN, Chief Medical Officer of the Ministry of Health, London.
Dr. A STAMPAR, Director of the Health Services, Ministry of Public Health of the Kingdom of the Serbs, Croats and Slovenes.
Professor W. H. WELCH, Director of the School of Public Health of the Johns Hopkins University, Baltimore.

2. *Far East Commission.*

President: Dr. JITTA.

Members:
Sir George BUCHANAN.
Surgeon-General CUMMING.
Dr. GRANVILLE.
Professor Ricardo JORGE.
Dr. LUTRARIO.
Professor MIMBELA.
Dr. RAYNAUD.
Dr. TSURUMI.
M. VELGHE.

3. *Malaria Commission.*

President: Dr. LUTRARIO.

Members:
Professor CANTACUZENE.
Dr. CHAGAS.
Professor NOCHT.
Professor OTTOLENGHI.
Professor PITTALUGA.
Dr. RAYNAUD.

3. *Malaria Commission* (continued).

Experts and Corresponding Members:

Colonel S. P. JAMES, Chief of Epidemiological Intelligence, Ministry of Health, London.
Professor E. MARCHOUX, of the Pasteur Institute, Paris.
Dr. L. ANIGSTEIN, of the State Institute of Hygiene, Warsaw.
Professor E. BRUMPT, of the Faculty of Medicine of the University of Paris.
Lt.-Col. S. R. CHRISTOPHERS, of the Central Research Institute, Kasauli (British India).
Professor M. CIUCA, of the Faculty of Medicine of the University of Jassy (Roumania).
Professor E. MARCINOWSKY, Director of the Institute of Tropical Medicine of Moscow.
Dr. A. LABRANCA, of the General Direction of Public Health Services, Rome.
Dr. K. MARKOFF, Malaria Inspector attached to the Public Health Service of Bulgaria.
Dr. DE BUEN, Inspector of the Central Malaria Commission, Madrid.
Dr. C. MOUTOUSSIS, Director of the Hygiene Laboratory, Athens.
Dr. A. SFARCIC, Director of the Anti-Malaria Station of Trogir, Kingdom of the Serbs, Croats and Slovenes.
Professor N. H. SWELLENGREBEL, of the Institute of Tropical Medicine, Amsterdam.
Dr. C. M. WENYON, Director of the Wellcome Bureau of Scientific Research, London.

4. *Cancer Commission.*

President: Sir George BUCHANAN.
Members: Professor Léon BERNARD.
Dr. CARRIÈRE.
Dr. JITTA.
Dr. LUTRARIO.

Sub-Committee of Statisticians of the Cancer Commission.

President: Dr. Major GREENWOOD, of the National Institute of Medical Research, London.
Members: Dr. H. W. METHORST, Director of the Central Bureau of Statistics of the Netherlands, The Hague.
Dr. A. NICEFORO, Professor of Statistics at the University of Naples.
Professor E. PITTARD, Professor of Anthropology at the University of Geneva.
Professor H. T. DEELMAN, Professor of Pathological Anatomy at the University of Groningen.
Dr. Janet Lane CLAYPON, London.

5. *Tuberculosis Commission.*

President: Dr. M. TSURUMI.
Members: Professor Léon BERNARD.
Surgeon-General CUMMING.
Professor MADSEN.
Professor OTTOLENGHI.
M. VELGHE.
Professor Araoz ALFARO, President of the National Health Council of Argentina.
Dr. Major GREENWOOD, of the National Institute of Medical Research, London.

6. *Opium Commission.*

President: Dr. CARRIÈRE.
Members: Dr. CHODZKO.
Professor Ricardo JORGE.
Professor NOCHT.
M. VELGHE.
Expert: Professor E. VON KNAFFL-LENZ, of the Faculty of Medicine of the University of Vienna.

7. *Temporary Mixed Anthrax Commission.*

Professor NOCHT.
Professor OTTOLENGHI.
Dr. RAYNAUD.
Professor E. L. COLLIS, of the School of Medicine, Cardiff.
Dr. D. GLIBERT, Inspector-General in the Ministry of Industry, Labour and Social Welfare, Brussels.
Dr. G. LORIGA, Chief Medical Inspector of the Ministry of National Economy, Italy.

8. *Commission on Standardisation of Sera, Serological Reactions and Biological Products.*

President: Professor MADSEN.
Members: Professor NOCHT.
Professor A. CALMETTE, Assistant Director of the Pasteur Institute, Paris.
Professor H. H. DALE, Director of the Bio-Chemical and Pharmacological Departments of the National Institute of Medical Research, London.
Dr. G. W. McCOY, Director of the Hygiene Laboratory, Washington.

9. *Commission of Experts for the Study of Sleeping-Sickness and Tuberculosis in Equatorial Africa.*

President: Dr. Andrew BALFOUR, Director of the School of Hygiene and Tropical Medicine, London.
Members: Dr. A. G. BAGSHAWE, Director of the Bureau of Hygiene and Tropical Diseases, London.
Dr. E. VAN CAMPENHOUT, Director of Health Services in the Colonial Ministry of Belgium.
Professor Gustave MARTIN, Principal Medical Officer of the Second Class, Colonial Forces; late Chief of the Sleeping-Sickness Mission in Equatorial Africa.

10. *International Sleeping-Sickness Commission.*

President: Dr. H. L. DUKE, Chief of the Entebbe Laboratory, Uganda.
Members: Professor F. KLEINE, of the Robert Koch Institute, Berlin.
Dr. LAVIER, of the Laboratory of Parasitology of the University of Paris.
Dr. M. PRATES, Chief of the Bacteriological Laboratory of Lorenzo Marques, Portuguese East Africa.
Dr. VAN HOOF, Chief of the Laboratory of Leopoldville, Belgian Congo.

11. *Smallpox and Vaccination Commission.*

President: Professor Ricardo JORGE.
Members: Sir George BUCHANAN.
Dr. CARRIÈRE.
Dr. JITTA.
Professor MADSEN.
Dr. F. R. BLAXALL, of the Government Lymph Establishment, London.
Professor H. A. GINS, of the Robert Koch Institute, Berlin.
Professor H. Mervyn GORDON, of St. Bartholomew's Hospital, London.
Professor C. LEVADITI, of the Pasteur Institute, Paris.
Professor G. SOBERNHEIM, of the Institute for the Study of Infectious Diseases, Berne.

BUDGET OF THE HEALTH ORGANISATION

		Estimates 1926	1925	1924	1924 Actual Expenditure
			Swiss francs		
I. *Secretariat:*					
1. Salaries of the Health Section		289,915	264,514	257,417	235,354
Deduct: Reductions in salaries due to lower cost of living	6,518				
2. Salaries of temporary staff	161,333				
Deduct: Appropriation in aid: part of Rockefeller Foundation Grants I, II and III	161,333				
Deduct: Reductions in salaries due to lower cost of living	4,018				
3. Travelling and removal expenses		55,000	40,000	45,000	55,145
4. General printing and documentation		3,500	6,000	5,250	3,003
5. Cables, telegrams and telephones		10,000	10,000	10,000	9,680
6. Miscellaneous petty expenses and unforeseen contingencies		2,500	5,000	5,000	2,415
II. *Epidemiological and Public Health Intelligence* .		137,250	142,250	126,453	113,306
1. Special reports and enquiries. . .	109,022				
Deduct: Appropriation in aid: part of Rockefeller Grant II	91,772	17,250	17,250	17,703	25,680
2. Publications.		60,000	60,000	43,750	45,876
3. Sanitary notifications and notifications in case of epidemics		15,000	15,000	15,000	—
4. Epidemiological enquiries		45,000	50,000	50,000	41,750
5. Collective and individual studies of public health statistics.	82,965				
Deduct: Appropriation in aid: part of Rockefeller Grant III	82,965	—	—	—	—
III. *Health Committee and Conferences*		340,000	192,000	142,000	269,917
1. Sessions of Health Committee		90,000	50,000	50,000	86,867
2. Special investigations (including expenses of technical sub-committees appointed by the Health Committee)		150,000	142,000	92,000	183,050
3. Technical conferences and enquiries on the spot		100,000	—	—	—
IV. *Interchanges of Public Health Personnel* . . .		150,000	150,000	50,000	33,747
1. Expenses in connection with a system of liaison between the various national public health services		150,000	150,000	50,000	33,747
2. Collective, specialised and individual interchanges	331,656				
Deduct : Appropriation in aid : part of Rockefeller Grant I . .	331,656	—	—	—	—
		988,165	809,764	641,120	722,567

Summary of Appropriations in Aid.

	Credits 1926	1925	1924	1924 Actual Expenditure
		Swiss francs		
Rockefeller Foundation Grants	667,726	512,302	481,326	628,884
I. For interchanges of public health personnel: $75,000 = ...	388,695	233,411	311,215	476,810
II. For Epidemiological Intelligence Service : $32,840 = ...	170,196	170,111	170,111	152,074
III. For study of demographic and public health statistics : $21,000 = ...	108,835	108,780	—	—

Chapter II.

EPIDEMIOLOGICAL INTELLIGENCE AND PUBLIC HEALTH STATISTICS.

One of the first duties which confronted the Health Organisation of the League of Nations was the organisation of a service of epidemiological intelligence. The Epidemic Commission found that it was impossible for the public health services of countries in Europe to wage an effective campaign against epidemics coming from the East until they were in possession of accurate information concerning the prevalence of epidemic diseases in Russia itself. The Health Organisation also realised that, as part of the framework of international co-operation in disease prevention, its first task must be to collect publish and distribute all available information concerning communicable diseases, so that the public health services of every Government would be in a position to adopt preventive measures based on a knowledge of the actual situation not only within its borders but all over the world. This task presented certain difficulties, of which the chief were the lack of uniformity in the methods of gathering such information in the different countries and the considerable differences in the completeness of reporting so that the notifications of one country could not be justly compared with those of another.

Epidemiological Intelligence Reports.

In 1921, the Health Section set itself the task of collecting all available information in regard to the prevalence and movement of certain epidemic diseases in Eastern Europe, where the situation was critical. The collection and tabulation of this information aided materially as a guide for the application of preventive measures, and was no doubt one of the means which led to the successful issue of the campaign. In the reports of the Epidemic Commission much of the epidemiological information so collected is summarised, and three volumes of reports were also issued, the first showing the epidemic disease situation in Eastern Europe (in 1921) as a whole, and the second and third containing detailed accounts of the movements of epidemics in Russia. Three other volumes were published describing the epidemic disease situation in Eastern and Central Europe in 1922. In the same year the International Health Board of the Rockefeller Foundation showed an interest in the work of gathering and distributing epidemiological intelligence by providing the Health Committee with a generous grant-in-aid as from January 1923. In July 1923 the first monthly report on the occurrence and prevalence of notifiable diseases was issued, and since that time this publication has been continued, including each month a larger area of the world and more complete and detailed information. Because of the necessity of collecting and distributing the material rapidly, provisional data are frequently used. It is highly desirable that exact data be provided, however, and for this purpose an annual report is issued containing a summary of the material published in the monthly reports, but corrected by the public health services of the various countries.

Annual Reports on Notifiable Diseases.

The first annual report of this kind was issued in 1923 and related to the notifiable disease situation in European countries during 1922. In 1924 a report was issued summarising the data received in 1923 and including a larger area of the world than had been possible in previous reports. The report issued in 1925 covered the year 1924 and contained important data on the movement of epidemics, the prevalence of notifiable diseases and certain mortality statistics from 29 European, 20 American, 17 African and 16 Asiatic countries, and Australia. The summary at the beginning of the volume gave a brief review of the behaviour of the more important epidemic diseases in 1924 as contrasted with the records from 1919. This feature of the annual report on notifiable diseases has been of considerable value to those who desire to secure quickly a comprehensive grasp of the prevalence of notifiable diseases in the world. The material for these reports is furnished voluntarily by the public health services of various countries and cities wherever this information is available. The information now being regularly received relates to over 60 per cent of the world's population. Ths significance of these monthly and annual reports is that they furnish in accessible form information not hitherto available. Their value lies in the practical use to which the information they contain may be put by public health administrations and the light they reflect on certain characteristics of epidemic disease not otherwise discernible. The geographical distribution, seasonal prevalence, distribution by age and sex, and lethality in various parts of the world reveal differences in the behaviour of disease which cannot fail to throw light on epidemiology and prevention. Eighty-six numbers of the *Monthly Epidemiological Report* have been issued, including

the twelve published in 1925. The contents now include telegraphic information from a large area in the Far East, where plague, cholera and smallpox are so important, reports on the existing prevalence of notifiable diseases, rates of birth, general and infant mortality and current reports on mortality from specified causes in certain large cities. A feature added in 1925 was the monthly publication of certain meteorological information, including mean temperature of the air, relative humidity, and the rainfall in millimeters for over a score of the most important cities of the world. The student of epidemiology who is interested in the relation of meteorological conditions to disease may find in the monthly reports ample and well-digested material for study.

Delays in Securing and Circulating Reports.

The epidemiological information published by the Health Section is valuable for administrative purposes in proportion to its timeliness. The difficulty in collecting information of this character through consular channels lies in the delays which always occur owing to the various agencies which must be approached. Many public health administrations now forward to Geneva provisional figures which are later substantiated or corrected. In the Far East, where the great plagues which afflict mankind originate, notably plague and cholera, immediate information in regard to new foci is essential if the authorities of neighbouring countries are to be enabled to take the necessary precautions. Even under the new conditions established by the Health Organisation there were considerable delays in receiving this information at Geneva and in transmitting it to the interested authorities by mail.

Mission sent to the Far East.

During the August 1922 meeting of the Health Committee, Doctor Miyajima proposed that a small mission should be sent to the Far East to collect information concerning the incidence and prevention of the more serious epidemic diseases which constituted international problems. The Health Committee received the proposal favourably, and, with the approval of the Council, despatched the Epidemic Commissioner on a tour of the principal ports of the Far East, from November 1922 to July 1923. His report recommending the establishment of a Bureau for the receipt and despatch of epidemiological information was approved by the Health Committee and the Council in 1924, and an International Conference was convened at Singapore to consider the work of the proposed Bureau and frame its budgetary estimates. The Conference was held from February 4th to 13th, 1925, and was attended by the following delegates:

British India	Lt.-Col. J. D. Graham, I.M.S.
British North Borneo . . .	Dr. P. A. Dingle
Ceylon	Dr. L. Nicholls
China	Dr. S. C. Yin
Federated Malay States . .	Dr. A. R. Wellington
French Indo-China	Dr. L'Herminier
Hong-Kong.	Dr. F. B. Addison
Japan	Dr. Ganzo Katoh
Netherlands East Indies . .	Dr. J. J. Van Lonkhuijzen
Philippine Islands	Dr. H. F. Smith (Observer)
Siam.	H.S.H. Prince Sakol
Straits Settlements	The Honourable Dr. A. L. Hoops

The Conference recommended that the public health administrations of countries having ports in Asia and Australia, east of Suez, should telegraph the Bureau on the first appearance of cholera, human or rat plague, smallpox, yellow fever, or unusual prevalence or mortality from any other infectious disease; that the Bureau should send to the interested administrations by wire a summary of the information received; that the letter confirming the telegram sent by the Bureau should include additional information on mortality, the graver epidemic diseases, and the particulars of movements of infected ships.

Certain other resolutions were adopted relating to the preparation of a telegraphic code, the collection and transmission of information concerning pilgrimages, the dispatch to the Bureau of reports of public health interest, and finally the desirability of setting up some form of advisory council. Finally the budget for 1925 was drawn up for presentation to the Health Committee.

The resolutions of the Conference were considered by the Far East Commission of the Health Committee during the regular session held in April 1925, when the budgetary and other proposals were approved and submitted to the Health Committee, which adopted the following resolution:

"The Health Committee adopts the report presented by the Far East Commission.

"The report is concerned with an examination of the recommendations formulated by the Conference which met at Singapore from February 4th to 13th, under the auspices of the Health Committee. The Conference included representatives of the sanitary administrations of British India, British North Borneo, Ceylon, China, Dutch Indies, the Federated Malay States, French Indo-China, Hong-Kong, Japan, Philippines, Siam and Straits Settlements. The report announces the establishment on March 1st of a Bureau of Epidemiological Intelligence for the Far East at Singapore and mentions the generous offers of the Governments of French Indo-China and the Dutch East Indies to transmit by wireless without charge the information collected by this Bureau.

"The Health Committee considers that the creation of an advisory committee would be of great value for the development of the Bureau. The advisory committee would serve as a special commission of the Health Committee and would consist of delegates from all the sanitary administrations which were invited to the Singapore Conference, as well as one or more representatives of the Health Committee of the League of Nations. A representative of the Health Committee would be the chairman of the advisory committee."

On the motion of Viscount Ishii, Rapporteur for the Health Organisation, the resolution was approved at the June meeting of the Council.

Opening of the Singapore Bureau.

The Bureau started work on March 1st, 1925, and shortly afterwards began distributing by telegraph information in regard to 35 ports from 12 of the countries represented at the first conference. In order to be of real value to the Far Eastern public health administrations, it was clear that information from a much larger number of ports must be collected and distributed. This was done by getting in touch with the different administrations, which responded generously, so that, at the end of December 1925, epidemiological intelligence was being received and transmitted regularly from approximately 76 ports belonging to 27 countries and including the principal ports of Asia, the East Coast of Africa and Australasia. Ultimately it is hoped to extend the work to 100 ports of 47 administrations. For administrative purposes the Far Eastern countries have been divided into four groups: western, central, eastern and southern. Maritime communication between the ports of each group is largely self-contained, so that special telegraphic messages may be prepared for each, instead of relaying the whole message to all the Far Eastern administrations.

Work of the Bureau.

(*a*) The various Far Eastern administrations send to the Bureau on Wednesday morning or earlier each week telegrams relating to the previous week ending Saturday midnight and containing the information previously described. This is in addition to telegrams relating to the first appearance of infectious diseases, which are dispatched immediately. A letter confirming the weekly telegram and containing additional information is sent to the Bureau by the first available post.

(*b*) The information contained in these weekly or special telegrams is incorporated by the Bureau into a weekly dispatch in code, which is sent by cable or wireless to the several administrations and to Geneva. The code used was prepared by the Bureau for the purpose and has considerably reduced the expense. The broadcasting is done free of charge by the powerful stations of Saigon and Bandoeng [1] (Java), thanks to the generosity of the Governments of French Indo-China and the Netherlands East Indies. The difficulties in receiving these broadcasts because of certain atmospheric conditions in the tropics is gradually being reduced, and the expense of direct cabling to administrations correspondingly decreased.

(*c*) A weekly leaflet is mailed to the administrations in the Far East, confirming the telegraphic message and containing certain additional information.

(*d*) Special cables are dispatched to particular administrations where such action is indicated by the character of the information received, as, for instance, in regard to the movements of ships from newly infected ports.

Other duties of the Bureau, suggested by the first Conference and undertaken as circumstances have permitted are:

(*a*) To disseminate information of value to the Far Eastern public health administrations and to the shipping world, such as quarantine notifications and legal requirements, movements of livestock and the presence of animal diseases, and vital and meteorological statistics.

[1] Other stations, notably Bombay and Sandakan (British North Borneo), have since begun broadcasting these messages.

(*b*) To act as a centre for co-ordinating the scientific investigations of the epidemiological problems of chief interest to the Far East.

(*c*) To act as an instructional centre for medical officers of health interested in statistical work.

(*d*) To distribute literature and information in regard to international health work, with particular reference to the Health Organisation of the League of Nations.

Financial Position of the Singapore Bureau.

The Bureau was established in 1925, thanks to the generosity of the International Health Board of the Rockefeller Foundation, which granted a subvention of $125,000 (gold) for a period of five years, during which time it was expected the Bureau would demonstrate its utility to such an extent that the various administrations concerned might make contributions towards its support. The first administration to do so was that of the Straits Settlements. Other administrations have since expressed their approval of the work of the Bureau by volunteering to contribute to the expense of its maintenance.

The following income and expenditure account shows the cost of the Bureau during the first ten months of its existence.

Dr.	Straits $ cts	Cr.	Straits $ cts
To staff salaries	15,859.80	By bank interest	64.46
To cables, postage and telegrams	19,375.99	By sales of periodicals	10.00
To printing and stationery . . .	1,259.02	By balance, being excess of expenditure over income transferred to Head Office Account .	43,433.18
To *Monthly Bulletin* and *Weekly Fasciculus*	2,248.50		
To rent, electricity and telephone	2,761.82		
To miscellaneous expenses . . .	1,002.51	*Note.* — Bank interest for the half-year to December 31st, 1925, is not included above.	
To reserve for leave pay and passages	1,000.00		
	43,507.64		43,507.64

Other Telegraphic Reports with reference to Infectious Diseases.

Certain administrations having ports in the Mediterranean and Black Sea have been approached in regard to the advisability of wiring to Geneva on the first appearance of plague or cholera. The Governments of Bulgaria, Egypt, Palestine, Roumania and Syria have already signified their willingness to telegraph such information to Geneva at their own expense.

International Unification of Morbidity and Mortality Statistics.

The collection and publication of morbidity and mortality statistics has soon made apparent the necessity for ensuring the uniformity of statistical methods in order to permit of international comparability. The Health Committee therefore decided in February 1924 to appoint special commissions of technical statisticians to advise and co-operate in the study of the following subjects:

1. Certification as to the causes of death and methods of classification of deaths when the certificate included several causes.
2. Uniformity in statistical presentation of mortality, with special reference to the sex and age groups in tables of mortality from all causes, as well as for specific causes.
3. Definition of still-births.
4. A standard population for use in the standardisation of mortality rates.

Commission for the Study of Joint Causes of Death.

Dr. T. H. C. Stevenson, of the Office of the Registrar-General of London.
Dr. W. H. Davis, Chief Statistician for Vital Statistics, Bureau of the Census, Washington.
Dr. S. Rosenfeld, Director of the Health Statistics Department of the Federal Ministry for Social Affairs, Department of Public Health, Vienna.
Dr. E. Roesle, of the Reichsgesundheitsamt, Berlin.

Commission for the Study of the Standard Million Population.

Professor A. NICEFORO, Professor of Statistics, University of Naples.
Professor E. WURZBURGER, late Director of the Central Statistical Service, Professor at the University of Leipzig.
Professor Edwin B. WILSON, Chief of the Department of Vital Statistics, School of Public Health, Harvard University.
Doctor J. BROWNLEE, Statistician to the Medical Research Council, London.

Commission for the Study of Age and Sex Classification.

Dr. H. J. HANSEN, Chief of the Medico-Statistical Bureau, Copenhagen.
Mr. R. H. COATS, Dominion Statistician and Controller of the Census, Ottawa.
Professor R. PEARL, Chief of the Department of Biometry and Vital Statistics of the Johns Hopkins University, Baltimore.
Commander A. ASCHIERI (deceased), late Director-General of the Central Statistical Bureau, Italy.

Commission to define Still-birth.

Dr. R. DUDFIELD (deceased), late Medical Officer of Health for Paddington, London.
Dr. E. L. HOLLAND, Obstetric and Gynæcological Surgeon to the London Hospital.
M. M. HUBER, Director of the "Statistique générale" of France.
Dr. Marcel NEY, Director of the Federal Statistical Bureau, Switzerland.
Professor G. HEDREN, Professor at the Karolinska Institute, Stockholm.

1. *The Commission to define Still-birth.*

This Commission has given a definition of dead-birth, has made suggestions as to the proper records to be kept and has drawn up rules for the compilation of natality, fertility and infant mortality rates. Their report was approved by the Health Committee in April 1925, and, upon the decision of the Council of the League, was circulated to the various Governments for their opinion.

The following is an extract from the report of the Commission to define Still-birth:

Proposed Definition.

It is requisite, in drafting the desired definition, to have a clear understanding of what constitutes a "birth" and when such "birth" is "complete".

In the proposed definition, the word "birth" means the separation and extrusion of a fœtus from the body of the parturient woman. The birth is to be deemed complete at the instant when the whole of the body of the fœtus—head, trunk, and limbs—is outside the body of the mother.

The birth is to be deemed a live-birth (as defined above) if after birth the infant breathes.

The act of respiration is incontrovertible evidence of life, and its continued absence is to be taken as proof of fœtal death.

It is desirable, for statistical purposes, that a distinction should be made between the birth of a fœtus which can normally be expected to be capable of an existence independent of its mother and the expulsion of one which cannot, births in the latter category being regarded as miscarriages (abortions).

A fœtus capable of an independent existence is a "viable fœtus" and is the product of a gestation which has lasted at least twenty-eight weeks. Such fœtus will normally measure at least 35 cm. from the crown of the head to the sole of the heel, the body being fully extended. The Committee is of opinion that the latter criterion is the more trustworthy.

Hence, a "dead-birth" is the birth of a fœtus, after twenty-eight weeks' pregnancy, in which pulmonary respiration does not occur; such a fœtus may die either: (*a*) before, (*b*) during, or (*c*) after birth, but before it has breathed.

Suggestions as to the Records to be Kept.

It is desirable that every live-birth should be entered in the *Register of Births*. An infant born alive but dying before registration of its birth should be entered both in the register of births and in that of deaths, the prescribed certificate of cause of death being produced at the time of registration or subsequently thereto, as may be by law directed.

It is desirable that every dead-birth should be inscribed in a *Record of Dead-Births*. The person responsible for the registration should be required to produce, whenever possible, a certificate of cause of death, such certificate to be signed by a recognised medical practitioner. The information to be given in the certificate and the form thereof should be prescribed by the competent authority.

In countries requiring the registration of births of non-viable fœtuses (as defined above), such births should, we consider, be entered in a separate record, with such information as to duration

of pregnancy, cause of abortion and other particulars as may be prescribed by the competent authority.

Rules for Compilation of Statistics.

Statistics of *natality* (birth-rates) will be based on the number of *live births.*

Statistics of *fertility* will be based on the number of *viable* births, both live and dead births.

Rates of *infant mortality* will be based on the numbers of *live births* and of deaths of infants under the age of one year (12 months).

The Governments of the following countries have commented upon the circulated report:

Argentine
Brazil
British India
Bulgaria
Czechoslovakia
France
Great Britain
Greece
Guatemala
Honduras
Nicaragua
Norway
Poland
Siam
South Africa
Venezuela

Most of these countries have accepted the proposed definition. Others have reserved decision pending further study. Two countries have made the suggestion that the Health Committee should prepare an international list of causes of dead-birth.

2. *Commission for the Study of Statistics of Causes of Death.*

This Commission met twice during 1925. The subjects of its deliberations were the following:

(*a*) The standard form of certificate of the cause of death.
(*b*) The tabulation of joint causes of death.
(*c*) Centralised tabulation of death certificates.

Various drafts for an international certificate of death were prepared and presented for opinion to a number of experts who participated in the second collective study tour of medical statisticians. The study of this subject is being continued.

The Commission drew up and presented to the Health Committee the following resolutions in regard to the tabulation of joint causes of death:

1. It is desirable that, where more than one cause is mentioned on a death certificate, information should be obtained as to their mutual relationships in that particular case.
2. The relationships of which knowledge is important for the selection of a single cause for tabulation are those of causation and of relative importance (principal and contributory).
3. In making selection from a train of related causes, it is necessary to follow a uniform procedure, irrespective of any selection by the certifier of one link in the chain as more important than the rest. Rules for such selection should be so drawn up as to operate as uniformly as possible for the same or similar trains of causes, irrespective of the degree of detail contained in the statement by the certifier.
4. In making a selection from unrelated causes the *principal* should generally be selected for tabulation in preference to contributory causes.

It has not been possible for the Commissions for the Study of the Standardisation of Death Rates (Standard Million Population) and of Age and Sex Classification to meet during the current year.

Special Studies and Investigations.

Among the special studies undertaken under the auspices of the Health Committee are Professor Seligmann's investigations and reports on meningitis, two of which were published in the *Monthly Epidemiological Reports* in 1925 (Nos. 71 and 77), and the final report in the form of a monograph; and Professor Rosenfeld's critical analysis of tuberculosis statistics, which was published in German and is later to be issued in abstract in French and English. Studies on scarlet fever and cholera have also been pursued.

(a) *Investigation of Reported Cases of Meningitis.*

The object of Professor Seligmann's study was to determine the proportion of reported cases of meningitis which were of the epidemic (meningococcus) type, and so to throw light on the general value of meningitis morbidity statistics. The final report contained statistics for Prussia for 1923 and 1924, the results of laboratory investigations and certain clinical and epidemiological

data, including the supposed sources of infection, the incidence of multiple cases in the family, predisposing factors and clinical characteristics.

Of interest from the point of view of the value of such notifications is the fact that, of 756 cases analysed, the presence of meningococci was demonstrated in 371 cases. Trauma and otitis were suggested as predisposing factors by the number of instances in which they were found to precede the disease. The serum treatment was not shown to have any effect in reducing the mortality.

(b) *Report on Tuberculosis Statistics.*

Professor Rosenfeld's report on tuberculosis statistics dealt with the principles that should govern the certification and tabulation of tuberculosis deaths in order to render these more exact and susceptible of international comparison. The report is a critical analysis of tuberculosis statistics as they now exist. Among other subjects, Professor Rosenfeld dealt with the influence of official regulations on tuberculosis statistics, the consequences of non-medical certification of tuberculosis deaths, the results of the non-confidential character of death certification, the consequences of enquiries made to physicians to ascertain the exact causes of deaths, the list of causes of death from various forms of tuberculosis as used in the different countries, the rules governing the selection of the principal cause of death when more than one cause is given, the influence of the physician on death certification, and the elaboration and presentation of tuberculosis statistics. The report contains a general summary of future work that must be carried out in order to prepare and present tuberculosis statistics which may be internationally comparable. The recommendations made with a view to achieving this object relate to the nomenclature, the age and sex groupings, the need for standardised rates, and the medical basis of death certification. The conclusion is that tuberculosis death rates as now prepared enable us to follow the variations in tuberculosis mortality if certain precautions indicated in the text are observed.

(c) *Study of Scarlet Fever Morbidity and Mortality.*

An important contribution to our knowledge of the prevalence and the characteristics of scarlet fever has been made by Doctor Roesle, who has presented a report concerning this disease in various countries of the world. A large amount of data has been assembled which should yield important conclusions in regard to immunity and susceptibility to the disease and throw light on many of its epidemiological characteristics not now well understood. The considerable differences in the virulence of scarlet fever in the eastern and western countries of Europe, and the remarkable chronological variations in lethality in the same country require elucidation which the analysis of the collected data should furnish.

(d) *Studies of Endemic Cholera.*

A memorandum on the epidemiology of cholera by Major A. J. H. Russell, the Director of Public Health in the Madras Presidency, was published during 1925. Major Russell's report deals with the endemic centres of cholera in India, with carriers, pandemics, routes of spread to the West, the effect of pilgrimages, the periodicity of cholera epidemics, the seasonal prevalence of cholera, and the incidence of the disease in relation to the food supply and vitality of the population. He concludes that Lower Bengal and the Valley of the Ganges is not the only endemic centre for cholera in India, but that the disease is very generally endemic in some degree throughout the greater part of the whole peninsula. Other endemic centres are suggested, such as may be found in Central Asia, in the Federated Malay States, in Indo-China, the Philippines and perhaps in Southern China. The report describes the epidemiological characteristics of cholera and points out the need for elucidating many problems which remain unsolved.

The report on cholera in the Rostov-on-Don area prepared by Professor Barikine and Dr. Cazeneuve describes the general sanitary conditions and gives the statistical data concerning the epidemics of cholera since 1920. The endemic situation in 1924 and 1925, in so far as cholera is concerned, is also described. Both endemic and epidemic types of the disease appear in localities in contact with refugees, where sanitary conditions are bad and where the population is debilitated on account of poverty and lack of food. New arrivals are more susceptible than permanent residents; children less susceptible than adults. The epidemics are spread largely through the ingestion of raw water from the rivers Don and Temernik, which receive human pollution. The cases occurring during years when cholera is endemic are characterised by remarkable mildness. Three types of vibrio are found in such cases: the true cholera vibrio of Koch, the choleriform vibrio and the phosphorescent vibrio; these, however, appear to be closely allied. It is probable that contact with these allied forms promotes among the inhabitants a certain immunity to the true form of the disease. The report concludes with the statement that this endemic focus does not appear to be a serious menace to the neighbouring districts of Russia and of Europe.

The morbidity and mortality from cholera in the world is sufficiently serious to warrant a campaign of study and prevention on the part of all interested administrations. This subject, with particular reference to the study of endemic foci, has already been discussed by the Advisory

Council of the Singapore Bureau, and it is one of the problems which that Bureau may be called upon to investigate, with the help of experts from the Public Health Services of the Far Eastern countries.

(*e*) *Public Health Work in the Ukraine.*

A report by Dr. S. A. Tomiline summarises the results of his critical analysis of the value of the demographic and epidemiological data available for the Ukraine. This document describes the sanitary and public health conditions among the rural population and includes chapters on the morbidity and mortality statistics and the more important health problems.

Public Health Surveys.

Reports on the organisation and administration of the public health services of various countries have been prepared for the Health Committee by public health officers of the following countries:

Australia	Hungary
Czechoslovakia	Japan (including parts of Korea and Manchuria)
Denmark	Kingdom of the Netherlands
French Colonies	Kingdom of the Serbs, Croats and Slovenes
Germany	Latvia.

These volumes are prepared on a uniform plan in order to permit of comparison between different countries. A general description is given of the central administration, with reference to the ministries concerned and the distribution of the various health activities. The budget is usually given in detail, and the legal basis of the health administration is described and references made to the most important public health legislation. The voluntary organisations or private agencies, such as the Red Cross, tuberculosis and welfare societies are described, with particular reference to their relationship to the official health departments. A general review is given of the more important health work, such as the campaign against tuberculosis, venereal diseases, typhoid fever, etc.; the administration of hospitals, maternity and child-welfare work, housing, sewerage, water-sypply, food inspection and control, disinfection, the training of public health officers and general public health education. The account of public health administration includes details of the organisation of the federal, State and communal systems and their inter-relationship and duties. Statistical data are given to show the importance of the national public health problems and the results of preventive work.

The "International Health Year-Book".

In 1925 the first volume of the *International Health Year-Book* appeared, containing reports on the public health progress of 22 countries in 1924. This publication was designed to supplement the public health surveys and to provide a record of the more important legislative and administrative achievements during each year. In each case the report was prepared by an official charged with this duty by the chief of the public health administration concerned. The scope of the report was laid down in a memorandum circulated to each administration and included general information on each country and its public health service, a summary of the epidemic disease situation, notes on the social diseases, and chapters on such subjects as legislation, hospitals, control of foods and drugs, protection of maternity and infancy, sanitation and immunisation. It is planned to issue a series of such yearly reports and to include as many countries as possible so as to make generally available current information on the sanitary conditions and public health progress of the world.

Handbooks on Vital Statistics.

One of the obstacles in the way of international comparability of vital statistics is the difficulty a student experiences in interpreting the statistical reports of a foreign country on account of his lack of knowledge concerning the registration laws and practices and the underlying political organisation. With a knowledge of the proper precautions to be observed and the necessary criteria which must be applied, it is possible in many instances to assemble statistical data from two or more countries for comparative purposes. To supply this need, the Health Organisation has published handbooks on the vital statistics of a number of countries, thus providing public health officers and other students of vital statistics with information formerly available to only a limited number of specialists. The preparation of these handbooks was entrusted to Dr. Major

Greenwood, Major Edge and Professor Westergaard (the Scandinavian countries), and to Mr. Sydenstricker (United States); the manuscripts were in all cases submitted to the statistical services concerned before publication. The contents include a brief general description of the country concerned, a more detailed memorandum of the establishment and responsibility for statistics, notes on the population and sources of population statistics, and a full account of the registration of live-births, still- or dead-births, deaths, infantile mortality, morbidity statistics and an analysis of the vital statistical publications of the more important municipalities. Conclusions and appendices are designed to indicate the subjects of enquiry on which light is thrown by the statistics and to show how certain criteria may be applied in order to enable the student to make intelligent comparisons of the trend of mortality in two or more countries.

Handbooks on the vital statistics of the following countries have been published:

Austria
Belgium
England and Wales
The Netherlands
Spain

Volumes on Czechoslovakia, Italy, Hungary, Portugal and the Scandinavian countries were prepared in 1925 and will be issued in 1926.

Interchanges of Medical Statisticians.

The third interchange of medical statisticians took place in 1925. The first and second were held in 1923 and 1924 respectively. All three formed part of a general plan intended to facilitate and co-ordinate statistical work by providing for the freest possible exchange of views between experts in charge of the statistical services of their respective countries. The first interchange of this kind studied the registration of births and deaths, statistics of population, and infant mortality. The participants were drawn from the public health services of eight countries, and visits were paid to the statistical offices of Switzerland, France, England and the Netherlands.

The second interchange included medical statisticians from nine countries, and the group visited Switzerland, France and the Netherlands, with a conference at Geneva for final discussion. The studies of this group were limited to the notification of infectious diseases as practised in the countries represented and visited.

The following statisticians participated in the third collective study tour, which began with visits to the statistical offices of Denmark, Sweden, Norway, Scotland, England, the Netherlands and Switzerland:

Austria:	Dr. S. Rosenfeld, Chief of the Statistical Bureau of the Health Administration;
Belgium:	Dr. Camille Jacquart, Director-General of the Central Statistical Bureau;
Denmark:	Dr. H. J. Hansen, Chief of the Medico-Statistical Bureau;
England:	Dr. T. H. C. Stevenson, Technical Adviser to the Registrar-General's Office;
Finland:	M. Martti Kovero, Director of the Central Statistical Bureau;
France:	M. M. Huber, Director of the "Statistique Générale" of France;
Germany:	Dr. E. Roesle, Medico-Statistical Adviser to the Health Administration;
Italy:	Professor A. Niceforo, Professor of Statistics, University of Naples;
Norway:	M. Gunnar Jahn, Director of the Central Statistical Bureau;
Scotland:	Dr. J. C. Dunlop, Registrar-General;
Sweden:	Dr. E. H. N. Arosenius, Chief of the Demographic Section, Central Statistical Bureau;
Switzerland:	Dr. Marcel Ney, Director of the Federal Statistical Bureau;
United States of America:	Dr. W. H. Davis, Chief Statistician of Vital Statistics, Census Bureau.

At the final conference in Geneva, agreement was reached on a number of subjects relating to uniform statistical practices, and the following recommandations were presented to the Health Committee:

1. Certification of cause of death by the attending physician.
2. Separation of purely medical information from data obtained for the use of the civil authorities.

3. Confidential character of the certification of the cause of death.

4. Uniformity of the death certificate in regard to the principal questions relating to the cause of death.

5. Uniform principles and rules for selection of the cause of death for primary tabulation where more than one cause is given.

6. Instruction of medical students in principles and purposes of death certification.

7. Centralisation of all demographic statistics and their direct tabulation from the certificates.

8. More detailed and uniform presentation of statistics, especially the use of five-year age groups by sex, specification of urban and rural districts, and of monthly distribution.

9. International regulation of enquiries into terms of doubtful significance.

10. Preparation of international handbook of causes of death, defining terms in use in the different countries.

Revision of the International List of Causes of Death.

During 1925 the American Public Health Association forwarded to the Health Committee the report of its Statistical Sub-Committee, which had been engaged for some time on the amendment of the International List of Causes of Death. The Health Committee was asked to assist the American Public Health Association in securing any recommendations which the statistical authorities of other countries might have prepared in view of the proposed international conference in 1929 to revise the list. It will be recalled that the present list was prepared many years ago and that the Convention of 1920, when the list was last revised, provided for holding the next conference in 1929. In view of these facts, the Health Committee, in October 1925, decided to include the revision of the International List in its programme of work, noted with satisfaction that the Scandinavian conference called to consider this subject proposed to forward the results of its work to the Health Committee, and requested the Medical Director to invite the views of other countries while continuing the present study. The resolution was approved by the Council of the League. Shortly afterwards a letter was received from the British Government indicating that the competent departments of that Government desired to co-operate and to take the fullest advantage of the facilities offered by the Health Committee in this work, and outlining the steps already taken by these departments in view of the forthcoming revision.

A letter was subsequently circulated to all Governments asking for the views of the competent departments in order that a memorandum might be prepared which would be of value in reaching new decisions at the next international conference.

International Sanitary Conventions.

(*a*) *Bilateral Sanitary Conventions.*

The European Health Conference, which was convened in 1922 by the Polish Government at the suggestion of the Health Organisation of the League, made a number of important recommendations for improving the epidemic situation of Eastern Europe. One of these recommendations related to the advisability of negotiating bilateral agreements concerning the precautions to be taken at frontiers and on navigable rivers passing through the territory of several States, in order to strengthen the sanitary defences and to promote closer co-operation between the respective health administrations. The Conference also recommended that Governments which had not yet adhered to the Paris International Sanitary Convention of 1912 should do so. A number of countries negotiated bilateral conventions on public health subjects of international importance and in many instances inserted a clause providing for recourse to the Health Organisation of the League in case of disputes as to the application of the Convention. The Council of the League approved the utilisation of the Health Organisation as an organ of conciliation and mediation by Governments in case of disagreements of this nature and laid down rules of procedure to be applied in such cases. Among the bilateral agreements negotiated between States as a result of the recommendations of the European Health Conference may be mentioned the following:

Esthonia and Russia;
Latvia and Russia;
Poland and Russia;
Latvia and Poland;
Germany and Poland;
Roumania and Poland;
Czechoslovakia and Poland;
Bulgaria and the Kingdom of the Serbs, Croats and Slovenes.

The conventions deal with the exchange of information about the incidence of disease, define infected districts, outline preventive measures on land and water frontiers, and detail the measures

of inspection, disinsecting, observation and quarantine to be applied. By the terms of these conventions, health administrations are authorised to deal directly with each other and with the Health Organisation of the League instead of through diplomatic channels as formerly, and many of the conventions include clauses providing for resort to the Health Organisation of the League in case of disputes in regard to interpretation or application.

(*b*) *Sanitary Convention on Traffic on Inland Waterways.*

A model Convention on the Sanitary Control of Traffic on Waterways was adopted by the Provisional Health Committee and referred to a mixed committee consisting of the Waterways Commission of the Health Organisation and a Sub-Committee of the Transit Organisation of the League. The Convention was studied by the European Health Conference at Warsaw and approved by the International Conference at Genoa. The Convention, as amended by the Mixed Commission, was later approved by the Health Committee and referred to the Office international d'Hygiène publique for advisory opinion with a view to forwarding it to Governments. The Convention was considered by the Permanent Committee of the Office, which passed it to the Health Committee, recommending that it be forwarded to Governments, together with an extract from the minutes of the Permanent Committee of the Office.

(*c*) Libre pratique : *The Dutch-Belgian Agreement.*

The Government of the Netherlands applied to the Health Committee for assistance in securing information as to the value of preventive measures applied to ships in ports of other countries in order to prevent the needless repetition of sanitary precautions. The Health Committee recommended the negotiation of such a convention between the Governments of the Kingdom of the Netherlands and Belgium. The Convention, which contains a clause providing for recourse to an international health organisation in case of difference arising out of its application or interpretation, has been negotiated between the Netherlands and Belgian Public Health Administrations.

(*d*) In the report of the mission to the Far East, which resulted in the establishment of the Singapore Bureau, definite proposals were inserted regarding agreements to be concluded between the Public Health Administrations in the Far East. This draft convention was circulated to Far Eastern administrations, several of which forwarded detailed comments and suggestions, which should be useful in the preparatory work for the revision of the Paris International Sanitary Conference of 1912.

Chapter III.

WORK OF THE COMMISSIONS.

In view of the number of subjects engaging its attention and of the technical character of some of the problems before it, the Health Committee has found it necessary to distribute the work among its members as its field of action grew wider. It has accordingly set up a certain number of technical commissions, which have been appointed permanently or provisionally according to the nature of the problems with which they have to deal.

Before reviewing the work done by these commissions in 1925 it should be observed that they are only advisory bodies. They study the problems arising in their special branch and submit proposals to the Health Committee, without whose approval they cannot take any action.

These commissions are, as a rule, presided over by a member of the Health Committee; they may also include, in addition to a certain number of the members of this Committee, other scientists, corresponding members and, if this is judged necessary for the progress of the work, technical experts. The Health Section of the Secretariat prepares and centralises investigations and collects and drafts the documents required for the work of the Health Committee and the commissions.

Malaria Commission.

The work of the Malaria Commission [1] covers an increasingly wide field, and in the summary given of this Commission's work we shall be obliged to deal separately with the various points which have engaged its attention.

Study Tours.

The Commission met at Geneva in March 1925 to draw up the final text of the report on the study tour made by certain of its members in 1924 in the Kingdom of the Serbs, Croats and Slovenes, Greece, Roumania, Bulgaria, Russia and Italy. This report (C.H.273) constitutes a source of information which it is no exaggeration to describe as unique of its kind, owing to the fact that it contains observations made at the same time and by the same group of observers in countries fighting against malaria under very different conditions. In the brief conclusions which it submits, the Commission in the first place considers that the so-called "primary" measures are always indispensable; they include the thorough treatment and "after-treatment" of all cases of malaria, the discovery of cases and the instruction of the inhabitants as to how malaria is spread. In the second place, the Commission does not recommend the prophylactic use of quinine except in special cases where a careful control is possible.

Despite the experience acquired, the Commission did not yet consider its information sufficiently complete to make any final pronouncement on the relative value of the different methods employed in the campaign against malaria.

At present there are two schools of thought among malariologists with regard to the importance to be attributed to the various methods of combating malaria. Some of them consider that drainage and measures for the destruction of larvæ and full-grown mosquitoes constitute the most effective weapon, while others are in favour of the intensive treatment of patients and the distribution of quinine as a prophylactic among the inhabitants of the malaria districts. Both opinions were held among the members of the Commission.

Accordingly, in view of the remarkable results achieved by the drainage works carried out in Palestine and Syria, the visit to these countries was of particular importance. In conformity with the programme drawn up the previous year, certain members of the Commission, Professors Nocht, Ottolenghi, Swellengrebel and Darling, Colonel James and Drs. Anigstein and Lothian, started on May 5th for Palestine. They were able to form an idea of the extent and value of the prophylactic work done both in the towns and in the country. This work was comparatively easy in the urban districts where the habitat of the mosquitoes was confined to the cisterns and wells which it was fairly easy to locate and then to seal up or cover with petroleum; but the same was not the case in the country, where there were marshes to be drained which involved a considerable amount of work. The measures taken showed the effectiveness of a well-conducted campaign of drainage; and the observations made in Palestine brought over all the members of the Commission to the side of this mode of anti-malaria prophylaxis. These observations are contained in a volume (C.H. Malaria 52) which includes: (1) a general report, reflecting the opinion of all those taking part; (2) an individual report by Professor Swellengrebel, who deals more particularly with the question of anophelism.

[1] See page 5.

The Commission had just arrived in Syria when the accident occurred at Beirut in which Drs. Darling and Lothian and Mlle. Besson, secretary-shorthand-typist of the Commission, lost their lives, and in which Professor Swellengrebel was seriously injured. The Commission's journey was thus tragically interrupted and the visit which was to be made to Sicily on the return journey had to be postponed to a later date.

Tributes were paid to the memory of the victims of this catastrophe at the Council's meeting in June 1925. The President of the Council and the Secretary-General spoke in high terms of the deceased; and Viscount Ishii, the Council's Rapporteur on health questions, also associated himself with the condolences expressed to their families.

Wishing to honour and perpetuate the memory of Dr. Darling and Dr. Lothian, the Health Committee decided: (1) to collect, by private subscription, a fund for the creation of a prize to be known as the "Darling Prize" and to be awarded to the scientist carrying out the most distinguished work on a subject connected with malaria; (2) to devote a portion of the credits provided for in the budget of the Health Organisation to the establishment of an individual scholarship to be known as the "Lothian Scholarship", and to be awarded by the Malaria Commission to a selected candidate.

From August 13th to September 7th, 1925, Professors Nocht, Ottolenghi and Raynaud, members of the Malaria Commission, Professors Ciuca, Swellengrebel and Brumpt, and Drs. Anigstein and Sfarcic, corresponding members, visited certain malarial districts of Spain under the expert guidance of Professor Pittaluga; the Commission went to Estramadura, Andalusia and the east coast of the Peninsula.

Thanks to the kindness of Dr. Murillo, Director-General of Public Health, official publications and detailed reports on malaria were placed at the disposal of the members of the Commission in each of the districts visited. We should like to take this opportunity of once more thanking the Spanish Government, under whose auspices this journey was organised, for the liberal hospitality which it extended to the members of the Commission.

The Commission took a keen interest in the question of rice-fields as the habitat of anopheles and convinced itself of the importance of the seasonal migration of agricultural labourers from he point of view of the propagation of malaria in certain dist ricts of Spain.

It fully appreciated the value of the results obtained by the Central Malaria Commission in tits campaign of prophylaxis, and visited certain of the dispensaries which had been installed at its suggestion.

The task which the Malaria Commission has mapped out for itself includes the drafting of a general report on the question of malaria in Europe. For this the Commission considers it indispensable to complete its information by a visit to the drainage and other improvement works in progress in Sicily. It has also been considered advisable that a small number of the members of the Commission should study the different aspects of the anti-malaria campaign in certain districts in the south of the United States of America in 1926. Accordingly, study tours in Sicily and the United States figure in the Commission's programme for 1926.

Teaching of Malariology.

Certain public health administrations, although determined to carry on a systematic campaign against malaria, are handicapped by the fact that they have not at their disposal a sufficient number of medical men who are specialised in the epidemiology of malaria and in the carrying out of drainage works.

With a view to providing a remedy for this state of affairs the Malaria Commission has taken the initiative in proposing to the Health Committee the creation of general courses of malariology for young doctors wishing to specialise in this branch and to enter upon the career of medical officers in the health administrations of their respective countries. The Health Committee adopted this suggestion and has made the necessary arrangements for these courses to be held in 1926.

The instruction given will be divided into two distinct parts: first, a theoretical course given in a suitable institute and accompanied by laboratory work; and, secondly, a period of practical studies to be carried out in a district in which the campaign against malaria is vigorously pursued under particularly competent guidance.

For the first part of this programme, Dr. A. Balfour, Professor Brumpt and Professor B. Nocht have consented to organise in May and June 1926 courses of theoretical teaching in malariology at their respective institutes in London, Paris and Hamburg for periods of one month.

The second part of the programme of study will consist of periods of several months spent in the marshy districts of Corsica, Italy, Spain and the Kingdom of the Serbs, Croats and Slovenes.

The Malaria Commission has also arranged that certain doctors who have already specialised in the study of malariology and take an active part in the campaign against malaria in their own countries should be awarded grants to allow them to spend periods of study with the directors of certain anti-malaria stations. Several members of the Malaria Commission have signified their willingness to allow such doctors to follow the researches they are pursuing, particularly with regard to the value of methods of treating the soil, such as the Italian "bonifications" and the Dutch system of canals.

Alkaloids of Cinchona.

The high cost of production of quinine is an obstacle to its use and many countries have been unable, owing to the smallness of their budgetary resources, to buy the stocks of quinine necessary for an intensive treatment of malaria patients. The question of the world production of quinine

has already been considered last year by the Commission, which received several reports from experts on this point.

As an increase in the cultivation of cinchona can only be effected at the end of a certain number of years, one of the best methods of remedying the high cost of quinine treatment would be to intensify the extraction of the secondary alkaloids contained in the cinchona bark, which possess febrifuge properties. These substances, which can be obtained in the process of manufacturing quinine, were hitherto considered as by-products without therapeutic value. The chief is cinchonine. The best course would appear to be to utilise the whole of the alkaloids contained in the cinchona bark for therapeutic purposes without previously extracting the quinine.

In view of these considerations, the Malaria Commission has decided to ask the directors of a certain number of hospitals in Algeria, Spain, Italy, Roumania and the Kingdom of the Serbs, Croats and Slovenes, who have malaria patients, to make clinical experiments with two preparations, namely, the quinetum and the hydrochlorate of cinchonine kindly placed at the Commission's disposal by the Amsterdam quinine factory and the Turin Government quinine factory. In order to make these experiments directly comparable, a form has been drawn up prescribing the methods of treatment, and the hospitals have been requested to fill in the different headings in each case, thus providing all the information required for the investigation. Although a number of these forms have already been filled in, it would be premature to attempt to form a final estimate of the therapeutic value of the drugs in question. Moreover, several hospitals wish to pursue their clinical experiments during the malaria season of 1926.

Enquiries undertaken at the Request of Governments.

Albania.

In 1923, the Albanian Government asked the Health Committee for its assistance in preparing a plan for an extensive campaign against malaria. The Health Committee appointed Dr. W. E. Haigh to study and report on health conditions in Albania.

At its session of May 1924, the Health Committee, having considered this report, decided to undertake a more detailed investigation with a view to drawing up a complete plan of campaign against malaria. Dr. Haigh accordingly returned to Albania and remained there from June to November 1924. During this second stay, he was asked by the Council to make a free distribution of quinine which had been purchased with the balance of the Albanian famine relief fund.

At its session of April 1925, the Health Committee considered Dr. Haigh's general report and adopted its recommendations as a whole. The programme of an active campaign against malaria outlined in the suggestions contained in this report may serve at the same time as a starting-point and as a basis for the whole health organisation of the country.

Corsica.

In consequence of a letter sent by the French Government to the League of Nations on November 13th, 1924, asking that experts should be appointed to study malaria conditions in Corsica, the Health Committee decided to appoint Drs. Raynaud and Marchoux to carry out this enquiry.

In April 1925, these two experts visited the coastal districts of the island regarded as malarial and travelled up the higher valleys where the inhabitants of the marshy plains take refuge in summer.

In the recommendations contained in the report they submitted to the Health Committee in October 1925, M. Raynaud and M. Marchoux emphasised the necessity of the economic reconstruction of the whole of Corsica before the island could be rendered healthy. They consider that the essentials of success are reforestation, which would permit of the regularisation of the course of the rivers, and the regular cultivation of arable land. The Committee came to the conclusion that the suggested measures, if properly applied, would furnish an instructive example which might be usefully followed in other countries; it therefore requested to be kept informed by an annual or half-yearly report of the progress made in Corsica and the results achieved. The Health Committee also decided to express its appreciation of the confidence which the French Government had placed in it by requesting its help in the conduct of the enquiry and in the recommendation of preventive measures.

Kingdom of the Serbs, Croats and Slovenes.

In pursuance of an invitation addressed to him by the Serb-Croat-Slovene Government to return to Southern Serbia and Macedonia in order to form an idea of the value of the anti-malarial measures taken in those districts, Professor Nocht, who had already visited these provinces during the study tour undertaken by the Malaria Commission last year in Eastern Europe, proceeded in June 1925 to Skoplje, Strip, Strumitza and Bitolj (document C. H. 367). Rather than institute fresh enquiries into the frequency and character of malaria in Macedonia, Professor Nocht considered it preferable to form an idea of the work of the anti-malaria stations, to interview the directors of these stations and, with their help, to make new plans for the campaign against malaria in the future. His objects were to find a basis for compiling reliable malaria statistics and to determine the principles to be followed in applying the measures which had been recommended by the members of the Commission after their journey in 1924 and which included the regular treatment of all patients, the tracing of parasite carriers and the destruction of mosquitoes in houses.

Professor Nocht sent a detailed report on the observations made during his journey to the Minister of Public Health of the Kingdom of the Serbs, Croats and Slovenes.

Dr. Stampar, director of the Health Administration of the Kingdom of the Serbs, Croats and Slovenes, warmly invited Professor Nocht to return to Macedonia in the summer of 1926.

First International Malaria Congress.

In conformity with the Health Committee's resolution, the Malaria Commission was represented by certain of its members at the First International Malaria Congress held at Rome in October 1925.

A special sitting was devoted to the communications submitted by the members of the Commission. Six of the thirteen persons elected members of the Permanent Malaria Congress were members of the Commission.

In one of its resolutions, the Congress, "considering the efforts already made by the Health Committee of the League of Nations, expresses the hope that close co-operation will be established between chemists, pharmacologists and clinical experts with a view to methodical experiments on all chemical bodies which may prove effective against malaria".

Programme of Study for 1926.

During its session in October 1925, the Malaria Commission drew up a detailed programme of research for 1926, which met with the Health Committee's approval. It is briefly summarised below without reverting to the question of the study tour, which has already been dealt with above.

The importance of river deltas from the point of view of endemic malaria will be studied simultaneously by Professors Cantacuzene, Ottolenghi and Pittaluga in the deltas of the Danube, Ebro and Po. The study of several important problems, such as the migration of anopheles from deserted places towards the hinterland, the habitat and feeding of anopheles in brackish waters, etc., will also be of great value.

The conditions under which the anopheles become infected and the mode of preservation of anopheles from year to year will form the subject of laboratory research by Colonel James, who is endeavouring to keep a stock of infected mosquitoes in order to transmit malaria experimentally to patients suffering from general paralysis in the various hospitals of England with a view to applying to them the treatment recently discovered against this affection. Similar investigations will be pursued by Professor Ottolenghi in his laboratory at Bologna and by Professor Marchoux at the Pasteur Institute.

Professor Swellengrebel will continue the biometrical study he has undertaken of the anophelene fauna of the Netherlands, in the course of which he will endeavour to discover whether there are any differences in the strains of anopheles according to the degree of saltness of the water in which they breed.

Professor Nocht has undertaken a series of experiments in regard to the hæmoglobinuria which sometimes supervenes in the course of malaria treatment, and has succeeded in obtaining this syndrome with quinine but not with cinchonine. He proposes to continue his experiments.

Lastly, the investigations undertaken by Professors Ottolenghi and Swellengrebel into the relative value of methods of drainage, such as the drainage on a large scale as carried out in Italy and the system of Dutch canals, will be continued.

Permanent Standardisation Committee.

At its meeting in October 1921, the Health Committee, on the Chairman's proposal, decided to begin the study of the standardisation of the units employed in various countries for the titration of certain therapeutic sera. Two international conferences (London, 1921-Paris 1922) were successively convened under the auspices of the League of Nations to prepare an extensive programme of work whose execution was entrusted to certain institutes and laboratories in various countries of Europe, in the United States and Japan.

How great has been the success of this attempt at international co-operation through the agency of laboratories will be shown in the following pages.

In view of the extent to which this research work has developed, the Health Committee considered necessary to entrust the direction and centralisation of the work to a permanent Standardisation Committee consisting of Professor Madsen (Copenhagen), Chairman, Professor Calmette (Paris), Dr. H. H. Dale (London), Professor MacCoy (Washington) and Professor Nocht (Hamburg).

The work undertaken comprises three separate questions:

(1) The standardisation of sera and of tuberculin;
(2) The biological standardisation of certain drugs, and
(3) The standardisation of serological texts for syphilis.

1. *Standardisation of Sera.*

The sero-therapeutic treatment of diseases caused by microbes demands, no less than treatment by drugs, an exact knowledge of the activity of the therapeutic agent employed; to measure this

activity, recourse is had, in the case of sera, to comparative titration, carried out by reference to a given standard, the latter consisting of a standard serum preserved either in liquid form or in the more stable form of a desiccated serum. To be mutually comparable, the titrations of one and the same serum—anti-diphtheritic serum for instance—should be based upon the application of a uniform method and should be effected with reference to the same standard. If these conditions could be fulfilled in all cases, anti-diphtheritic sera—to adhere to the example chosen—would become practically equivalent, whatever the source of the individual serum. Such standardisation would certainly afford considerable advantages from the threefold aspect of the comparison of therapeutic results, the intrinsic value of the product placed in the hands of medical practitioners, and the importation of sera. If the whole question of the titration of sera is considered from an international point of view, it must be recognised that, until quite recently, both the standards adopted and the methods of titration applied varied considerably in the different countries. The Standardisation Committee had therefore to make every endeavour to secure uniformity in this domain.

The first serum to which the Standardisation Committee devoted its attention was the *anti-diphtheric serum.* Up to 1914, the antitoxic unit which had been prepared by Ehrlich and had been been preserved at the Frankfort Institute of Experimental Therapeutics was used as an international standard; but during the period of hostilities, owing to the impossibility of carrying out comparisons between certain national standards and that of Ehrlich, a second unit was adopted in the United States.

The first problem which arose was the comparison of the old Frankfort standard with the new American standard. These two units were found to be equivalent. The old Ehrlich standard was accepted as the new international unit and its preservation was entrusted to the Danish State Sero-therapeutic Institute. This Institute offered its services to any countries wishing periodically to check their national standard with the international standard; in 1925 several countries availed themselves of this offer and the results obtained were concordant on all points.

The Standardisation Committee also laid down the number of anti-toxin units to be contained in the ampulæ of anti-diphtheric serum, and agreed to recommend that 10,000 anti-toxin units should be used as a therapeutic dose and 1,000 units as a preventive dose. A question which has recently arisen is whether it is desirable to standardise the mixtures of diphtheria toxin and anti-toxin used in the Schick test; since this test makes it possible to detect the persons liable to contract diphtheria, there might have been some advantage in making the results directly comparable as between various countries. The Standardisation Committee felt, however, that it would be premature to take up this question.

The question of *anti-dysentery* serum was easily solved at a Conference held in Geneva in 1924, thanks to the method of work adopted. This method may be briefly described here, since it applies to all research work carried out under the auspices of the Standardisation Committee. When the Committee decides to undertake the investigation of a problem, it draws up a detailed scheme of work and entrusts its execution to a certain number of laboratories, both official and private. The results of this research work are communicated to the Sero-therapeutic Institute at Copenhagen, which acts as a central laboratory. As soon as the Standardisation Committee judges that the information on experiments sent in is sufficient for the elucidation of the problem, it decides to convene a meeting of those who have made the experiments, in the course of which any slight differences of opinion which may exist are easily removed. On the subject of the titration of the anti-dysentery serum, opinions still differed with regard to the type of bacillus to be employed, the nature of the toxin to be used, the method of making injections and the choice of the animal to be experimented upon.

On the basis of the numerous reports on experiments which had been sent in, however, agreement was reached on the following lines: utilisation of the Shiga bacillus, employment of a liquid or desiccated toxin, intravenous injection into the caudal vein of the mouse. Professor Madsen kindly undertook to prepare the future standard which has recently been distributed in the form of a desiccated serum to the various laboratories concerned in the research work on that question. There is every reason to hope that this new standard will be accepted as an international standard.

At the previous conferences, the problem of standardising the titration of anti-tetanus serum had been considered and the setting-up of a new international unit advocated. In view of the great variety of standards used and the great differences between them, the Standardisation Committee fixed its choice on a unit representing the mean between the extreme values of anti-tetanus units in use in various countries.

Notwithstanding extensive laboratory research work, and in spite of the titrations carried out between various laboratories in Europe and the United States, this new standard has not secured unanimous approval. The Committee, therefore, is considering whether the solution of the problem might not lie in adopting, internationally, one of the national standards now in use.

It must be borne in mind that any change in the value of a standard unit is likely somewhat to disturb the therapeutic habits of medical men; if the most widely used standard were adopted, this difficulty would, so far as possible, be avoided. In any case, and whatever standard is selected by the Committee, the question will be satisfactorily settled before long.

During its session in April 1925, the HealthC ommittee requested Professor D. OTTOLENGHI to enquire into the possibility of standardising the methods employed in the titration of anti-anthrax serum, which is steadily proving its effectiveness as a therapeutic agent in cases of malignant pustule in men.

After obtaining information from the various serum-producing institutes regarding the methods of manufacture and titration adopted by them, Professor Ottolenghi presented a preliminary Report (C.H.388) on the subject to the Health Committee at its session in October

1925. Proposals will be put forward regarding the measures which are calculated to secure uniformity in methods of titration.

In previous years, the Standardisation Committee had requested a number of experts to enquire into the possibility of standardising other sera, such, for instance, as anti-meningococcus sera, anti-pneumococcus and anti-streptococcus sera; but, owing to difficulties which are scarcely to be overcome in the present state of our knowledge and which are of too purely technical a character to be discussed here, the standardisation of such sera cannot, at the present moment, be contemplated with any great hope of success.

Tuberculin.

At the session held in October 1924, the Health Committee, acting on a suggestion of the Tuberculosis Committee, appointed a special committee to enquire into the possibility of standardising and improving the methods employed in the titration of tuberculin, the substance given off by the tuberculosis bacillus, and used either for the diagnosis of human or bovine tuberculosis, or for the treatment of that disease in human beings. Up till then, the methods adopted in the preparation of tuberculin had been far from uniform, with the result that, in the absence of a strictly accurate method of titration, the various samples on the market showed appreciable differences in strength.

The committee appointed to study tuberculin, which consists of Dr. Tsurumi, Chairman, Professor Calmette, Professor Léon Bernard and Professor Madsen, began by preparing a questionnaire (document C.H.285), which was sent to the tuberculin-producing institutes throughout the world, for the purpose of obtaining detailed information on the methods of production and titration adopted by them. Thirty-four laboratories, in sixteen different countries, responded to the request, and the information thus collected reveals appreciable differences in the methods of preparation, especially in the manner of filtration. Laboratory research work was undertaken in the Pasteur Institute in Paris, under the guidance of Professor Calmette. It has led to the devising of a new method for the titration of tuberculin which seems likely to give more accurate results than the methods hitherto adopted. To enable the value of this new method to be tested with a large number of tuberculin samples obtained from different sources, a number of institutes were requested to supply Professor Calmette with samples of the tuberculin prepared by them. With the results of these tests before it, the Committee will be able to judge of the value of the new method and may be in a position to make proposals for its adoption as a standard method.

2. *Biological Standardisation.*

While it is a matter of paramount importance that the efficacy of sera should be investigated on uniform lines, it is equally important — in the interests of the patients themselves — that the efficacy and toxicity of certain very potent drugs which cannot be assayed by chemical means should be accurately determined by identical biological methods.

Drugs of this kind include either extracts of organs used in opotherapy, such as insulin — the specific for diabetes — or vegetable extracts such as digitalis — the heart tonic *par excellence* — or organic compounds of complex structure such as the arseno-benzols, which are so extensively used in these days in the treatment of syphilis. Hitherto the titration of such remedies has not everywhere been regulated, and an appreciable number of preparations placed on the market are of small therapeutic value and would be pitilessly rejected had they been required to stand certain tests designed to show either their activity or their innocuous character.

To protect themselves against the importation of therapeutically worthless preparations, a number of States nowadays require that, before importation, certain preparations shall have been previously titrated in the manner advocated by their official testing institutes. The great advantages which the pharmaceutical industry would reap from international standardisation of the methods of biological titration will be readily appreciated.

In order to reach an agreement on this point, the Health Committee, at the suggestion of Dr. H. H. Dale, and at the proposal of Professor Madsen, convened a First International Conference, at Edinburgh in July 1923, for the Biological Standardisation of Certain Drugs.

This Conference, which was attended by representatives of pharmacological science from Germany, America, Austria, Belgium, Great Britain, Canada, Denmark, France and the Netherlands, considered the possibility of setting up a standard of activity which would prove acceptable to all countries for a series of drugs appearing in the pharmacopœia and requiring titration by biological means.

The only resolutions which the Conference was able finally to adopt, however, were those relating to the standardisation of adrenaline and *Filix mas*, as, in the case of the other drugs, sufficiently accurate methods of titration were lacking.

An extensive programme of research work was drawn up, and its execution entrusted to various laboratories in Europe and America. In order that the work undertaken in pursuance of this plan might be properly co-ordinated, it was decided to entrust the centralisation of results to Dr. Dale, of the London Medical Research Council.

Thanks to the research work carried on in numerous laboratories, the progress made has been so great that it was found possible to hold a Second International Conference for the Biological Standardisation of Certain Drugs in Geneva, from August 31st to September 3rd, 1925.

This Conference met under the Chairmanship of Dr. H. H. Dale, of the National Institute for Medical Research in London, and was attended by the following doctors:

Dr. Cushny, Professor of Pharmacology at the University of Edinburgh;
Dr. Dixon, Professor of Pharmacology at the University of Cambridge;
Dr. Edmunds, Professor of Therapeutics at the University of Michigan;
Dr. Heymans, Professor of Therapeutics at the University of Ghent;
Dr. Knaffl-Lenz, Professor of Pharmacology at the University of Vienna;
Dr. Kolle, Director of the Institute of Experimental Therapeutics of Frankfort;
Dr. Krogh, Professor of Animal Physiology at the University of Copenhagen;
Dr. MacLeod, Professor of Physiology at the University of Toronto;
Dr. Magnus, Professor of Pharmacology at the University of Utrecht;
Dr. Meyer, Honorary Professor of Pharmacology at the University of Vienna;
Dr. Poulsson, Professor of Pharmacology at the University of Oslo;
Dr. Reid Hunt, Professor of Pharmacology at the University of Harvard;
Dr. Rost, Professor of Pharmacology at the University of Berlin;
Dr. Straub, Professor of Pharmacology at the University of Munich;
Dr. Tiffeneau, Professor of Pharmacology at the University of Paris;
Dr. Trendelenburg, Professor of Pharmacology at the University of Freiburg in Breisgau;
Dr. Voegtlin, Head of the Pharmacological Department of the Hygienic Laboratory in Washington.

Notwithstanding their technical character, the various resolutions adopted by the Conference (C.532.M.183.1925.III) may be briefly reviewed.

With respect to *pituitary extract*, it was decided that the dried extracted substance of the posterior lobe, which was recommended to the Edinburgh Conference, should be taken as the international standard. Professor Voegtlin was requested to furnish a small sample of the standard to any official laboratory which might need it for confirmation of its own national standard.

With respect to *insulin*, the Conference adopted, as an international standard, a dried preparation of insulin hydrochloride, 1 milligram of which was to be regarded as containing 8 units of insulin as defined by the Insulin Committee of Toronto. This Committee supervises the manufacture of insulin in Canada, and numbers among its members Professor Macleod, to whom the discovery of this product is due.

With respect to *digitalis*, the international standard selected is to be of the same strength as the powder prepared in accordance with the decision of the First International Conference in Edinburgh. A reserve supply of this powder is to be kept by Professor Magnus and distributed by him for international use.

With respect to the *arseno-benzols*, the Conference also adopted the principle of titration in relation to a determined standard. Standard samples of the principal arsenic derivatives are to be kept, either by Professor Kolle or by Professor Voegtlin. Before issue for therapeutic use, each batch of arseno-benzol must have been tested, on animals artificially infected with a suitable strain of trypanosomes for therapeutic potency, and on normal animals for toxicity.

As regards the titration of *thyroid gland* extract, the Conference felt that it was unnecessary to have recourse to biological methods, since the determination of the iodine was a sufficient indication of the content in active thyroid principles. As a standard of activity, it recommended the activity of a dried preparation of healthy thyroid gland with an iodine content of 0.2 per cent, and invited Professor Reid Hunt to hold a sample of thyroid gland extract corresponding to that definition at the disposal of laboratories in the various countries.

With regard to the titration of *ergot*, the conference has not yet reached a final decision. Experiments will have to be undertaken with a view to comparing the results obtained both by the biological method and by the chemical method advocated by Professor Straub.

Oil of *chenopodium and vitamines*—more especially the growth-promoting A—will also require more extensive laboratory research work before definite recommendations can be put forward on the standardisation of the methods of titration to be used.

The Conference decided to investigate the methods for the standardisation of *para-thyroid extract* and *ovarian extract*, and to issue a publication describing in detail the methods to be followed in the titration of the above-mentioned drugs.

Finally, in response to the wish expressed by the Health Committee, the Conference passed a resolution in favour of a campaign for the international control of the traffic in secret remedies and proprietary remedies. It should be mentioned that, at the session held in April 1925, the Health Committee had received a memorandum from Professor Poulsson (C.H. 312) regarding the abuses entailed by the employment of proprietary medicines and that it had decided to refer this memorandum, for observations, to the Second International Conference on Biological Standardisation.

The Second Conference expressed the hope that the Health Committee would endeavour to lay down certain principles and so provide a basis on which the different countries might be able to deal with the matter, in the interest of the health of their own peoples.

At its meeting in October, 1925, the Health Committee, acting on this resolution, requested Professor Léon Bernard and M. Velghe to submit, for its next session, a report on the legal and medical aspects of the question of secret remedies and medical quackery.

The whole of the resolutions adopted by the Second International Conference on Biological Standardisation were communicated to the Second International Conference for the Unification of

the Formulæ of Powerful Drugs *(médicaments héroïques)*, which met in Brussels on September 21st, 1925, and adopted the following recommendations:

(1) That biological standardisation should be introduced into the pharmacopœias wherever this is necessary;
(2) That, unless there are good reasons to the contrary, the pharmacopœias should adopt the methods which have been or may in future be recommended by the Health Organisation of the League of Nations;
(3) That the Pharmacopœia Commissions should forward to the Health Organisation of the League of Nations any observations or suggestions they may wish to make with regard to the methods in question.

The Brussels Conference considered, further, that it was desirable to establish an international organisation for the unification of pharmacopœias and to set up two international committees to study the standardisation of methods for the chemical and physico-chemical titration of powerful drugs, and of the methods of preparing powerful officinal medicaments. To this end, the organising Committee of the Conference has been requested to approach the Belgian Government and to request it to open negotiations with the League of Nations with a view to definitely setting up this permanent secretariat and the other committees which the Conference decided, in principle, to create.

3. *Serological Tests for Syphilis.*

The Second International Conference on Standardisation (Paris 1922) decided to make a comparative study of the various technical methods employed in the serological diagnosis of syphilis. Preliminary investigations having revealed discrepancies in the results obtained by different experts when examining the same serum, the Health Committee decided to convene a technical conference of laboratories at Copenhagen in November 1923, at which specially qualified serological experts endeavoured to discover the reasons for these discrepancies by undertaking simultaneous examinations of the same sera according to the methods which they advocated. By comparing the results obtained, it has been possible to draw certain highly interesting technical conclusions. The Conference laid stress on the desirability of providing that serological examinations should be made free of charge, and of entrusting serological tests for syphilis only to a properly qualified staff, which would keep in close touch with the clinical services; furthermore, a uniform system of notation was advocated, with the object of making the results obtained from serological tests for syphilis internationally comparable.

To give effect to a resolution passed by the Health Committee at the session held in February 1924, a letter had been sent to the Health Authorities in the various countries drawing their attention to certain recommendations made by the Copenhagen Conference. These authorities were requested to give their opinion as to whether these recommendations would be suitable for practical application in their country at the present time.

At the session held in September 1924, the Health Committee had before it the replies of nineteen health administrations (document C. H. 223). The replies of Great Britain, the Irish Free State, Czechoslovakia, Japan and Belgium, and particulars relating to Russia which were sent in by Professor Tarassevitch (C. H. 289), were communicated to the Committee at the session held in April 1925. Taken as a whole, these replies show that a large number of Health Authorities have endorsed the Health Committee's proposals and have, in particular, introduced the system of notation advocated by the Copenhagen Conference.

Although no meeting was held in 1925 to continue the work begun in Copenhagen, research work is nevertheless being prosecuted in the laboratories. This research work aims at determining whether, in the present state of our knowledge, it is possible to standardise the extracts of organs which serve, in some sense, as reagents in the serological diagnosis of syphilis, as this would greatly facilitate the securing of concordant and directly comparable results.

It should be noted that hitherto the persons attending the standardisation conferences have been exclusively scientific men, whose opinions in no way commit their Governments. Hence, once the research work in progress has been completed, and once a greater number of standards have been finally adopted by the committees of experts, the Health Committee proposes, as a means of giving effect to the decisions of these technical committees, to convene Government representatives and to submit to them for approval the methods advocated by the specialists, with a view to these methods being officially and internationally adopted.

Commission of Experts on Sleeping-Sickness and Tuberculosis in Equatorial Africa.

This Commission [1] submitted at the session of the Health Committee held in April 1925 a Report on Sleeping-Sickness and Tuberculosis in Equatorial Africa (document C. H. 281), prepared by Drs. A. Balfour, E. van Campenhout, G. Martin and A. G. Bagshawe.

This new document, which is intended to complete the report drawn up by the Commission in 1923 (C. 8. M. 6. 1924. III), contains detailed information regarding the incidence of tuberculosis

[1] See page 6.

and trypanosomiasis in the Italian, Spanish and Portuguese possessions in Africa—a matter which had not been dealt with in the previous report.

At a meeting held in London in September 1924, the Commission emphasised the importance of sending a special mission to some district in which sleeping-sickness was prevalent, for the purpose of studying certain problems which are of capital importance for the prevention and therapeutic treatment of this disease.

This suggestion was approved by the Health Committee and afterwards by the Council, which instructed the Secretary-General to send a letter to the Foreign Ministers of Belgium, France, Great Britain, Italy, Portugal and Spain, asking them whether they would agree to hold a conference of representatives of their Colonial Ministries to discuss, from the administrative and financial points of view, the desirability of sending such a mission to Africa.

All the Governments concerned agreed to this proposal, and at the request of the British Government a Conference was held at the Colonial Office in London from May 19th to 22nd, 1925.

This International Conference on Sleeping-Sickness was held under the chairmanship of the Honourable W. G. A. Ormesby-Gore, Under-Secretary of State for the Colonies, and was composed of delegates from Belgium, France, Great Britain, Italy, Portugal and Spain (document C. H. 334). The administrative recommendations adopted at the Conference referred to the relations to be established between medical officers and administrative staffs stationed on both sides of frontiers, the introduction of a sanitary passport for natives desiring to cross from one country to another and the desirability of a uniform method of recording cases of sleeping-sickness.

The Conference further recommended that an international commission should be formed to study in Equatorial Africa a number of problems relating to the epidemiology of sleeping-sickness, such as the existence of any human immunity from trypanosomiasis, the comparative value, from a curative and prophylactic point of view, of trypanocidal agents, and the part played by animals as virus reservoirs. It was arranged that the International Commission should spend a year at Entebbe, on Lake Victoria, as the Government of Uganda had been good enough to inform the Council that it was prepared to place the laboratory there at the Commission's disposal for a year. At the end of that period, the Commission would submit a report to the Health Committee. The town of Entebbe is very favourably situated for the study of the subjects which, in the Conference's opinion, are likely to lead to an increase in our knowledge of the prophylaxis and treatment of sleeping-sickness.

Lastly, the Conference decided to request the Governments concerned to contribute to a common fund to cover the cost of the expedition and recommended that these Governments should endeavour to provide at least £3,000 to be placed to the credit of the Health Organisation's budget for 1926 for purposes of the Commission's work.

At its session in June 1925, the Council approved the resolutions of the International Conference on Sleeping-Sickness, which were submitted to it by Viscount Ishii. To cover the expenses of the expedition, certain Governments generously offered to contribute to a common pool. The Belgian Government promised 100,000 francs, the French Government 50,000 francs, the Spanish Government 4,000 pesetas, the Portuguese Government £500 and the British Government £2,050. In addition, a credit of £2,000 was provided in the budget of the Health Organisation for 1926. On the proposal of the Governments concerned and of the London Conference, the experts chosen to be members of the Commission were: Dr. Duke, Head of the Entebbe Laboratory, who was appointed Chairman of the Commission and was placed in charge of its work; Dr. Lavier, of the Parasitological Laboratory of the University of Paris; Dr. van Hoof, Head of the Leopoldville Laboratory (Congo); Dr. M. Prates, Head of the Lorenzo-Marquez Laboratory (Mozambique), and Professor Kleine, of the Robert Koch Institute, Berlin.

These experts met at Entebbe at the beginning of February 1926 and are now carrying on their researches along the lines laid down by the London Conference. The Government of Uganda has generously placed all facilities at the Commission's disposal for its work, and there is every reason to believe that the research-work thus jointly undertaken on an international scale will notably increase our knowledge of the prophylaxis and treatment of sleeping-sickness, which causes such widespread ravages in certain parts of the Continent of Africa.

Opium Commission.

The Advisory Committee on the Traffic in Opium appointed by the Council of the League of Nations in accordance with a resolution adopted by the Assembly on December 15th, 1920, considered that, in order to obtain an adequate basis for the study of the limitation of the production of narcotics, it was essential to know the quantities of these products necessary for the legitimate requirements of the world. A Joint Sub-Committee, composed of members of that Committee and of the Health Committee of the League, was appointed to study this problem on the basis of the information obtained from the various Governments by the Opium Section of the League. After having defined the term "legitimate requirements" and decided that medical and scientific requirements alone could be considered legitimate, the Sub-Committee thought that the total figure for these requirements, calculated in raw opium with 10 per cent morphine, could be fixed at 600 milligrams per head per year.

When the Joint Sub-Committee's report was submitted to the Health Committee, however, the latter thought the figure of 600 mgr. too high, and reduced it to 450 mgr., with a proviso to the effect that this figure should be regarded as a maximum and should only be applicable to countries possessing a highly developed system of medical assistance. At the request of the Preparatory Committee of the Second Opium Conference, which was to be held at Geneva in

November 1924, the Opium Committee[1] set up by the Health Committee took steps to complete its data by instructing its expert, Professor Knaffl-Lenz, of Vienna, to ascertain the consumption of opium and opiates in hospitals and sickness-insurance institutions in a number of countries. From his study of this question, M. Knaffl-Lenz deduced a figure of about 400 mgr. of raw opium per head per year, an estimate which confirmed the figure of 450 mgr. obtained from the information supplied direct by the Governments. Sub-Committee F of the Second Opium Conference accepted this estimate but pointed out that the figure of 450 mgr. made very inadequate allowance for the quantities of morphine consumed in the form of codeine or alkaloids; the demand for these varied widely in different countries and only a few Governments had sent detailed information in regard to them.

In April 1925, the Opium Committee submitted to the Health Committee a report (document C.H.314) on certain provisions of the new International Opium Convention concluded at Geneva on February 19th, 1925. These provisions are contained in Articles 8 and 10 of this Convention, and their application will require the co-operation of the Health Committee and of the Permanent Committee of the " Office international d'hygiène publique ".

Article 10 refers to drugs which are to be recognised as liable to abuse similar to that of the toxico-maniac substances previously referred to, and lays down that the provisions of the Convention shall consequently be applied to such drugs.

Article 8, on the other hand, is intended to withdraw from the effects of the Convention certain preparations which indeed contain a narcotic, but so combined with other substances that it cannot, in practice, be recovered for use as a narcotic.

In both cases it was laid down that, before taking any decision, the Permanent Committee of the " Office international d'hygiène publique " would be asked by the Health Committee to give a reasoned opinion on the question.

As regards Article 10, Professor Knaffl-Lenz, in a report well supported by documentary proof (document C.H.264), drew the attention of the Opium Commission, of which he is the expert, to two products — eukodal and dicodid. Both these products are derivatives of morphine and codeine and both have already been proved to have pernicious effects. They are, indeed, dangerous substances and likely to become substitutes for morphine once the latter drug has been made inaccessible to drug addicts. The Committee agreed with its expert and thought that both these medicaments should be brought to the notice of the Permanent Committee of the " Office international d'hygiène publique " with a view to asking its opinion as to the desirability of classing them with the products referred to in Article 10.

As regards Article 8, the Committee decided to ask the Health Committee to invite several States to supply it with a list of the products which should, in their opinion, benefit by the provisions of this article. As soon as it is in possession of this information, the Committee will draw up a general list which it will submit to the Permanent Committee of the " Office international d'hygiène publique " for its opinion and report thereon, accompanied by any suggestions and observations which it may think necessary.

These proposals were accepted by the Health Committee, and accordingly a letter was sent, on November 6th, 1925, to all Governments asking them to draw up a list of products which should be withdrawn from the effects of the Convention.

Up to the present, replies have been received from Great Britain, Canada, Latvia and the Union of South Africa. These replies may be summarised as follows:

In a note from Sir George Buchanan, the British Ministry of Health gave a list of 17 preparations containing, in addition to opium, emetics or poison which prevent their being misused.

The Canadian Department of Health gave a list of the products to which the Opium and Narcotics Regulations apply, and pointed out that the effect of increasing the list of preparations to be withdrawn from the effects of the Convention might lead to a certain amount of confusion in regard to the dispensing of narcotics by pharmacies.

The Latvian Department of Health gave a list of products to which its decree regarding drugs applies, and considered that dicodid should be added to this list, but that tincture and extract of coca should be excluded from it.

The Government of the Union of South Africa also sent a list of medicaments which it considered should be excluded from the scope of the Convention either on account of the nature of the substances with which the opium contained in them is combined or because of the small quantity of opiate they contain.

Lastly, the Health Committee decided to ask the Permanent Committee of the " Office international d'hygiène publique " to take forthwith all steps required for carrying out investigations needed for the preliminary opinions it will be asked to give regarding the desirability of placing within the scope of the Convention such medicaments as the Health Committee may bring to its notice.

Cancer Commission.

The study of certain aspects of the cancer problem by the Health Organisation of the League of Nations and the formation of a special commission for that purpose were the outcome of a proposal by Sir George Buchanan submitted to the Health Committee at its session held in May

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[1] See page 5.

1923. This proposal was to the effect that the investigations which had been begun in Great Britain on the comparative mortality from cancer in different countries should be carried out internationally. Before giving an account of the progress of the work of the Cancer Commission [1], it should be observed that the enquiry undertaken under its auspices has a strictly limited object, namely, to determine the causes of the considerable differences in the official statistics of Great Britain, Holland and Italy as regards the mortality rate of two special forms of cancer, namely, cancer of the breast and cancer of the uterus.

These two varieties of cancer were selected because they represent neoplasic forms which are so clear and distinct that it is unlikely that the deaths resulting from them fail to be attributed to them in official death-rate statistics.

The three countries in question were chosen both because their systems of death registration are well organised and have been in operation for several years and also because the death-rate in Great Britain from these two varieties of cancer is much greater than the mean death-rate from the same causes in Holland and Italy.

There are two possible ways of approaching this problem. In the first place, a statistical study could be made of all demographic factors such as age, personal status, race, etc., which might affect the incidence of cancer in the three countries under consideration; and, secondly, the antecedents of patients could be investigated and an attempt could be made to trace the clinical development of the tumour in order to find out whether certain factors, such as fecundity, lactation and surgical treatment, for example, furnish any explanation of the differences found. In other words, the enquiry undertaken could be of a demographic or of a clinical character. The Cancer Commission, however, decided from the outset to adopt both methods.

The statistical enquiry was carried out in close co-operation with a special committee of statisticians appointed for that purpose, which included Drs. GREENWOOD and METHORST, Professors PITTARD, NICEFORO and DEELMAN and Dr. Lane CLAYPON.

It was important, as a first step, to throw light on the question whether the observed differences between the three countries under consideration were real or due to artificial statistical data. It was found, as a result of research based on the most modern methods of calculation, that these differences were real.

This point having been established, the methods of statistical analysis were applied to the study of the possible correlation between personal status and the mortality rate of cancer of the breast and of the uterus in the three countries in question, the relation between this mortality, rate and fecundity, between the general death-rate and the cancer death-rate, etc. The following conclusions may be deduced from the results of these investigations; among unmarried women the death-rate from cancer of the breast is highest and the death-rate from cancer of the uterus is lowest. The incidence of cancer of the breast and of the uterus is in inverse proportion to the number of children born. The differences noted in the incidence of cancer in different parts of the same country are sufficiently marked in all three countries to be of value from a statistical point of view. It is therefore necessary to make a detailed study of the geographical distribution of cancer.

The clinical enquiry was carried out on uniform lines in England, Italy and the Netherlands. It was decided to ascertain the clinical antecedents of a number of women suffering from cancer of the breast and an equal number of women of corresponding ages showing no symptoms of a neoplasic affection. For this purpose a form was prepared and was distributed to a number of hospitals. As yet the Commission has only been able to examine in detail the results obtained in England and Holland. It endeavoured in particular to discover the incidence of abortion in the two classes of women examined, the possible influence of heredity, lactation, the ages at which menstruation and menopause appear and the occurrence of trauma during parturition.

Special attention was given to the question of surgical treatment, and it was shown that as a rule such treatment prolonged the lives of patients by at least three years and sometimes, under favourable conditions, by as much as ten years.

It had been thought that the much lower death-rate from cancer in the breast in the Netherlands as compared with Great Britain was due to the fact that surgical treatment was much more often applied in the former country than in the latter. The Commission is convinced that this explanation is incorrect, and that, on the contrary, the proportion of cases in which women suffering from cancer of the breast undergo surgical treatment is unfortunately very small in both countries. This fact was confirmed by subsequent investigations in Italian hospitals, and it was found that in each of these three countries *at least* a third of the women suffering from cancer of the breast die without having undergone radical treatment. The Commission therefore thought it desirable to bring these facts to the notice of doctors in all three countries.

The Commission also followed with keen interest both the studies carried on in Switzerland relating to the possible correlation between the incidence of cancer and that of goitre, and those undertaken in the United States, which seem to show that predisposition to cancer is more pronounced in America among women of British than among those of Italian origin. If this hypothesis were confirmed, the same differences would be found among the second generation of emigrants as existed in the country of their origin in so far as susceptibility to cancer is concerned. Realising the possible importance of the racial factor, the Commission, at its meeting in October 1925, decided to ask Professors PITTARD and NICEFORO to undertake a study of the relations which may exist between race and the incidence of cancer mortality.

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[1] See page 5.

In spite of the fact that they are still incomplete, the data collected on certain ætiological factors predisposing to cancer have a real value, in that they throw a certain amount of light on aspects of the cancer problem which have been hitherto obscure, because the material necessary for their study could be collected only by means of an international enquiry.

Tuberculosis Commission.

In virtue of a resolution adopted by the Fifth Assembly, the Health Committee was informed of the request of the Kingdom of the Serbs, Croats and Slovenes for its technical collaboration in the task of collecting practical information concerning anti-tuberculosis measures and their value as shown by the experience of the different countries. A similar appeal had been addressed to the Committee by the Congress of the International Anti-Tuberculosis Union, held at Lausanne.

As the Health Committee did not consider that it was its function to solve clinical or therapeutical problems, it was decided to proceed at once to make a preliminary study of the question, Dr. Y. Biraud being instructed to draw up a report, from the point of view of statistics, on the question of the decline of tuberculosis mortality in different countries (document C. H. 291).

The object of this report was to show whether a comparative study of the statistics of different countries was possible and could shed light upon the causes of the decline. The results of the enquiry were submitted to the Tuberculosis Commission [1], which had been formed by the Health Committee at its session in April 1925.

To the question whether a decline in tuberculosis mortality had really taken place, Dr. Biraud replies in the affirmative. In the various countries under consideration, however, the decline has not taken place at the same rate and has not reached the same point, but the pulmonary form has declined faster than any other clinical form. This decline is the more striking when one considers that tuberculosis is better diagnosed and more frankly reported as a cause of death now than in the past.

The explanation of the decline must be sought outside the causative organism of tuberculosis, since, as is shown by laboratory tests, the virulence of this bacillus has been remarkably constant during the last 35 years. It remains to be seen, therefore, whether the explanation does not lie in the changes of resistance opposed by the human race to the invasion of the causative organism. After discussing the various opinions given on these changes of resistance, which have been explained as the result of natural selection, hereditary transmission, and relative racial immunity, Dr. Biraud comes to the conclusion that the most evident causes of the decline in tuberculosis mortality are: the improvement of conditions of life in the form of better food and housing; the segregation of cases of open, and therefore infectious, tuberculosis in hospitals and sanatoria, and the increasing knowledge of prophylactic measures among patients and their families, due to the work of dispensaries and their staffs.

As Dr. Biraud's preliminary enquiry revealed the possibility of undertaking a study covering a wider field, the Tuberculosis Commission decided to continue its work by carrying on partial or general enquiries in countries where conditions were favourable for a statistical study of the question, and recommended that countries having a declining, stationary or increasing tuberculosis mortality should be chosen, a classification of countries in this respect having been greatly facilitated by the comprehensive memorandum prepared by Dr. Rosenfeld on tuberculosis statistics (document C. H. 284).

The Commission urged that no social factors should be neglected. It therefore adopted the conclusions of Dr. Biraud's report, which proposed that the enquiry should cover: (1) a comparative study of the tuberculosis death rate and the death rate from all causes, (2) the action of food, (3) the relationship between the consumption of milk and "infantile" mortality, (4) the influence of industrial work, (5) the part played by the direct anti-tuberculosis measures specified above.

The Commission considered that the following factors should also be studied: (1) the part played by conditions of labour and conditions of life in agriculture and trade, (2) the part played by works of general sanitary improvement in towns, and, in particular, housing improvements, (3) the relationship between alcoholism and tuberculosis.

Denmark, Norway and Sweden appeared to be particularly suitable for a general enquiry, both on account of their geographical, climatic and racial unity and because the statistics of all three of these countries were very reliable and covered a long period.

Accordingly, a Conference was held in September 1925 at the Danish State Sero-Therapeutic Institute, with Professor Madsen in the chair. It was attended by Dr. Heitmann, Chief of the Tuberculosis Service of the Norwegian Health Administration, Dr. Neander, Director of the Swedish National Anti-Tuberculosis League, Dr. Ostenfeld, of the Danish Anti-Tuberculosis Association, Dr. Biraud, and, as technical advisers, Drs. Permien and Hansen, of Copenhagen. After considering in detail the possible fields of study, the Conference adopted a programme of joint action under which those pursuing the enquiry would forthwith proceed to prepare and exchange detailed statistics of tuberculosis mortality in the different countries, and would carry out on identical lines an examination of the various factors in tuberculosis mortality. It was further decided to hold a second conference at Stockholm in 1926 to discuss the results obtained.

[1] See page 5.

Concurrently with this work, a general enquiry into the influence of the various factors in tuberculosis mortality in France, and more particularly in Paris, was undertaken, under the direction of Professor Léon Bernard, by Dr. Evrot, assisted by the technical services of the National Anti-Tuberculosis Committee.

The relations between mortality from all causes and tuberculosis mortality were studied by the Statistical Department of the Health Section on the basis of the mortality figures for England and Wales, Bavaria and Switzerland. It appears from this statistical comparison that tuberculosis mortality has declined more rapidly than mortality from all causes, although the rate of decline was the same up to 1900.

Two special subjects were considered in detail by Dr. Biraud. These were, first, the influence of city life and of the "tuberculisation" of populations on tuberculosis mortality, and, secondly, differences of tuberculosis mortality by sex, and their explanation by differences of occupation as between men and women. In this work Dr. Biraud had the benefit of the valuable advice of Dr. M. Greenwood, who has acted as expert to the Commission.

In response to the desire expressed in the proposal which the Kingdom of the Serbs, Croats and Slovenes submitted to the Fourth Assembly, the Health Section collected information as to the cost of the different forms of the anti-tuberculosis campaign carried on in a number of countries. The object of this enquiry was to find the best method of distributing the funds available among the various activities connected with the anti-tuberculosis campaign (dispensaries, sanatoria, hospitals, health education, etc.).

At its session in October 1925, a request was referred to the Tuberculosis Commission which the High Commissioner of the South African Union had sent to the Health Committee, asking for its help in an enquiry into tuberculosis among the native tribes of South Africa, with special reference to the incidence, prophylaxis and treatment of the disease among the natives employed in the South African mines.

Profiting by the presence of Dr. Mitchell, Director-General of Public Health in the South African Union, who had been good enough to come to Geneva to examine with the members of the Tuberculosis Commission the possibilities of a joint enquiry, the Commission, after having heard a very able statement of the position by Dr. Mitchell, drew up a number of proposals which were submitted for the approval of the Health Committee. The latter adopted a resolution to the effect that, in its opinion, such an enquiry should prove of great utility in the study of the general problem of tuberculosis and would also afford a wide field for the study and application of methods of producing immunity, and that it was prepared in principle to co-operate in these investigations and to consider the question further on the receipt of subsequent information from the health authorities of South Africa.

Lastly, the Tuberculosis Commission, on being notified by its Chairman, Dr. Tsurumi, of a proposal to the effect that a study of tuberculin should be undertaken, considered that that question should be referred to the Commission on Standards (see page 22).

Commission on Public Health Training.

The scheme of work which this Commission [1] proposes to adopt cannot be better described than in the terms which the Commission itself uses in defining its aims and methods. "Its aim: to determine what factors, derived from public health instruction, can best conduce to the improvement of human well-being, and not to make any claim to judge of the merits of the different systems of public health instruction employed at universities. Its method: not to direct its enquiries towards ascertaining the intrinsic value of university programmes, still less the merits of the persons responsible for carrying them out, but to analyse the results obtained from the different types of public health instruction, their influence upon medical education, and their practical effect on the public in general, by carrying out personal and first-hand enquiries in an impartial and scientific spirit, such as will enable all university authorities and administrations to realise the high aims of the mission which has been undertaken".

Imbued with this spirit, members of the Commission carried out a first-hand study of the various systems of public health instruction in use in the universities and technical colleges of a number of countries. The impressions received in the course of these tours are given in the reports of Professor Ricardo Jorge on Holland, Professor Ottolenghi on Switzerland and Syria, Professor Madsen on Sweden and Norway, and Dr. Chodzko on Denmark and Roumania.

In the summer of 1925, Professor Léon Bernard went to Brazil, the Argentine Republic, and Uruguay to carry out a similar investigation there. He also endeavoured to spread the knowledge of the Health Section's work with a view to bringing about closer co-operation between Latin-American health experts and the Health Organisation. In order to enlighten the circles concerned on the health work of the League of Nations, Professor Léon Bernard, at the request of his Latin-American colleagues, gave a series of lectures at Rio de Janeiro, Montevideo and Buenos-Aires.

At its session in October 1925, the Commission on Public Health Training heard a remarkable report (document C. H. 375) by one of its most distinguished members, Sir George Newman, Chief Medical Officer of the British Ministry of Health and Board of Education. After having referred to the high appreciation felt by the British Ministry of Health for the work undertaken

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[1] See page 4.

under the auspices of the Health Organisation, Sir George Newman stated that the old public health system, which had consisted very largely of sanitary laws affecting environment, little emphasis being laid upon individual education, had now vanished, and the new theory of preventive medicine, which was founded almost entirely upon the education of the doctor, the expert, and the public, was coming increasingly to the fore. It was most desirable that all medical teaching at universities should be based on this theory.

In response to the request of his colleagues, Sir George Newman agreed to draft a memorandum on the various systems of public health instruction followed in the countries, which the Commission had studied, with the object of considering and analysing the various opinions thereby brought to light, deriving general suggestions from them and indicating what, in his opinion, should be the basic principle of such instruction.

At its session in October 1925, the Commission on Public Health Instruction was invited by Dr. Wroczynski, Director of the Polish Health Service, to hold its next meeting at Warsaw in April 1926, on the occasion of the opening of the State School of Hygiene, which is to be attached to the Polish State Institute of Hygiene. The Commission decided to accept this invitation and to make a comparative study of the curricula of the new schools of hygiene which have been or are to be opened at Belgrade, London, Prague, Warsaw and Zagreb. It was also decided that at this session Professor Madsen should report on the observations regarding public health instruction in the universities of Sweden which he made during his recent visit to that country.

Chapter IV.

INTERCHANGES OF PUBLIC HEALTH PERSONNEL

One of the duties of the Health Organisation is to promote international co-operation in the field of public health. The system of interchanges of public health personnel is designed to promote such co-operation, and successive Assemblies have approved this work, which was one of the main items in the programme of the Health Committee at its inception, viz.: "to bring administrative health authorities in different countries into closer touch with each other". The Health Committee has endeavoured to develop this work by means of collective study tours of public health officers and by missions for individual medical officers of health in special cases. The system of interchanges was initiated in October 1922 through the generosity of the International Health Board of the Rockefeller Foundation, which granted a subvention to finance the first study tours and has continued to show an active interest in this part of the Health Committee's programme by continuing and increasing its contribution. The Assembly has also voted increasing credits for this purpose from the League's budget.

Two types of interchanges have been held by the Health Committee:

(*a*) Those intended for health officers responsible for general health work;

(*b*) Those restricted to health officers with special interests, such as tuberculosis prevention, child hygiene, medical inspection of school-children and port sanitation.

Organisation of Collective Interchanges.

During the Health Committee's spring session, the programme of interchanges for the succeeding year is established. Letters are despatched to all public health administrations calling attention to the interchanges which the Health Committee proposes to hold, setting out the conditions which govern the interchanges and inviting nominations. Those public health officers who appear to be the most suitable candidates are selected, having due regard to the needs of the public health services to which they are attached and the personal qualifications of the candidates. The public health services of the countries to be visited draw up a detailed programme in co-operation with the Health Section, and as much documentation as possible on their organisation and administration is distributed to the candidates before the interchange opens. The interchange lasts from five to seven weeks, and in the past the number of participants has varied from nine to thirty. One or more countries are visited according to their area and the interest they present from the public health point of view. The study tour begins with a series of general conferences designed to acquaint the participants with the organisation, duties and historical development of the services to be visited. Then follows a period of inspection lasting several weeks, during which the participants are frequently divided into small groups in order to allow each member to make a minute examination of the health services in particular areas without interfering unduly with their normal operation. The final conference is usually held in Geneva, where each participant reads a paper on some subject to which he has paid particular attention, and general discussion takes place. The work of the Health Organisation in particular, and of the League of Nations in general, is explained to the group before the members disperse.

Table of Interchanges of Public Health Personnel from 1922 to 1924.

1. *General Public Health Activities.*

Date of opening	Date of closing	Countries visited	Number of participants	Number of nationalities represented	Final conference.
Oct. 9, 1922	Dec. 18, 1922	Belgium, Italy, Poland, Netherlands	21	7	Geneva, Dec. 17-18, 1922
Feb. 24, 1923	April 12, 1923	England	29	16	Geneva, May 16, 17, 18, 1923
April 14, 1923	May 15, 1923	Austria			
Sept. 23, 1923	Dec. 31, 1923	United States of America	18	16	Geneva, Dec. 27-31, 1923
Feb. 1, 1924	April 17, 1924	Great Britain	19	17	Geneva, April 12-17, 1924
April 24, 1924	May 30, 1924	Netherlands	24	21	Geneva, July 16, 1924
June 1, 1924	July 16, 1924	Denmark			
Aug. 10, 1924	Sept. 20, 1924	Switzerland	20	13	Geneva, Dec. 17-20, 1924

2. *Special Public Health Activities.*

Date of opening	Date of closing	Countries visited	Number of participants	Number of nationalities represented	Subjects studied	Final conference
May 21, 1923	June 15, 1923	Italy	16	11	Malaria	Geneva, June 14-15, 1923
Feb. 6, 1924	May 3, 1924	Austria, Feb. 6-17 Czechosl., Feb. 18-22 Hungary, Feb. 23-26 France, Feb. 29 to March 12 Belgium, March 13-21 Great Britain, March 22–April 12 Netherlands, April 13-21 Switzerland, April 22-30	16	13	Tuberculosis	Geneva, May 1-3, 1924
March 21, 1924	May 7, 1924	Great Britain, March 21 to April 11 Belgium, April 14-29 Netherlands, May 1-7	13	12	School hygiene	The Hague, May 7-10, 1924

Collective Interchanges held in 1925.

Eight interchange tours took place in 1925.

I. *Great Britain.*

This interchange began in London on February 8th and closed at Geneva on March 27th after a Conference. Fifteen medical officers of health from thirteen countries participated [1].

The programme, as usual, was in the hands of a special Committee of the Society of British Medical Officers of Health, and the Ministry of Health showed a deep interest in the interchange, Mr. Neville Chamberlain, the Minister, and Sir George Newman, Chief Medical Officer, giving introductory addresses. The participants were then divided into four groups and were allocated to the following districts: (1) Leeds and West Riding (Yorkshire), (2) Wolverhampton and Staffordshire, (3) Willesden and Middlesex, (4) London. In each of these areas, the health authorities had prepared a detailed programme which enabled the participants to study at first hand housing, waste disposal, control of infectious diseases, medical inspection of schools, control of milk supplies, hospitals, supervision of foodstuffs, and the system of health insurance. The groups later re-assembled in London and were received at the Ministry of Health, where lectures were delivered on maternity and child-welfare work, measures to combat tuberculosis and venereal disease, national health insurance, control over articles of food, and port sanitary administration. The entire group visited the Royal Navy Medical College, the General Register Office, the Royal Army Medical College, the London Port Sanitary Service, the Metropolitan Fever Hospital and Water Board, the Home Office, the Royal Sanitary Institute and a number of other important institutions.

II. *Interchange of Public Health Officers from Latin America in North America and Europe.*

Owing to the length and the expense of the journey, it had not been possible hitherto for the public health officers of Latin America to participate in the system of interchanges. A collective study tour restricted to medical officers from these countries was therefore held in 1925. The group met at Havana on March 4th and remained in Cuba until March 12th. The period from March 13th to April 30th was spent in the United States, followed by visits lasting a fortnight to the industrial and rural districts of Canada.

Great Britain was visited from May 30th to June 13th and the Netherlands and Belgium from June 19th to July 4th. From Belgium the group proceeded to Switzerland, and a conference was held in Geneva from July 5th to July 12th, after which the group proceeded to France (July 12th to July 26th) and Italy (July 28th to August 8th); here the collective interchange ended, the members proceeding on individual missions to European countries best adapted for their

[1] United States of America, Canada, Denmark, Esthonia, France, Germany, Greece, Holland, Italy, Norway, Poland, Russia, Kingdom of the Serbs, Croats and Slovenes.

special needs. Ten medical officers of health from as many Southern and Central American countries participated [1].

The President and the Government of the Republic of Cuba gave a most generous welcome to the participants, a special presidential decree providing for the extension of all possible facilities. The visit was so successful that the Director-General of the Cuban Health Service proposed that Cuba should be made the headquarters of a more permanent system of interchanges in Latin America.

The programme for the visit to the United States was prepared by Surgeon-General H. S. Cumming, with the assistance of his colleagues in the United States Public Health Service and the State and municipal health officers of the States and cities visited. The members of the group were also received by the International Health Board of the Rockefeller Foundation, which placed at the disposal of the candidates every facility afforded by its organisation and had the opportunity of examining closely the public health work, methods and institutions of the Southern, Central and Northern States. In Washington, the group was received by the United States Public Health Service and other departments and bureaux of the Government concerned in federal public health administration, such as the Maternity and Child Welfare Bureau of the Department of Labour, the Food and Drugs Bureau of the Department of Agriculture, and the Bureau of the Census.

The tour of two weeks' duration in Canada enabled the participants to observe health conditions and sanitary practices in the rural and industrial regions of Eastern Canada under the guidance of the Dominion and provincial health officials.

In Great Britain the interchange programme, which was as usual in charge of the Society of British Medical Officers of Health, enabled the participants to compare the application of the public health measures as practised under English conditions with the health work studied in Cuba, the United States and Canada.

In the Netherlands, the studies of the groups were directed particularly to housing and vital statistics. In France, particular attention was paid to the anti-tuberculosis programme and to the child-welfare agencies. Social hygiene dispensaries in Belgium were studied in detail, and in Switzerland particular attention was paid to sanatoria and preventoria intended for the treatment and prevention of tuberculosis. After the conference in Geneva, held in common with the group of health officers who had visited the Kingdom of the Serbs, Croats and Slovenes, the Latin-American group proceeded to Italy, where the members were given an opportunity to examine every phase of the anti-malaria campaign. The group divided up in Italy, each member proceeding to some European country which presented special interest from the point of view of his own work. During the conference at Geneva, each member gave a brief description of the public health problems in his own country and the organisation of the public health services to which he was attached.

III. *Interchange in Belgium.*

This interchange began in Brussels on May 4th with a series of the usual general conferences and closed on June 24th at Geneva with a final conference.

Fifteen medical officers representing thirteen countries participated [2], and each was given two specially prepared volumes of which the first described the organisation of the Belgian public health services and the second consisted of a collection of all the sanitary laws and regulations of the country. General conferences on the political and social organisation of Belgium, with particular reference to the public health services, were followed by a series of visits to institutions and organisations. General conferences for the exchange of views on subjects that had been studied and institutions visited occupied the last two days of the stay in Belgium, after which the group proceeded to Geneva, where papers were read on a sanitary inspection in Belgium, rural hygiene, co-operation between State and local health officers, the control of infectious diseases, organisation of the public disinfection services, the teaching of hygiene, school medical inspection and the housing problem.

IV. *General Interchange in the Kingdom of the Serbs, Croats and Slovenes.*

Sixteen medical officers of health belonging to thirteen different nationalities [3] participated in the general interchange in the Kingdom of the Serbs, Croats and Slovenes, where the Government generously offered complete hospitality to all the members during the whole of their stay in that country.

The members of the interchange arrived in Belgrade on May 17th, where they were received by Dr. A. Stampar, Chief of the Public Health Services. After a series of conferences dealing with the history and the unification of the Kingdom of the Serbs, Croats and Slovenes, the State services and the organisation and administration of the public health service, visits were made to the Central Institute for Hygiene, the Institute for Social Medicine, the Laboratory for Tropical Diseases, the

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[1] Argentine, Brazil, Colombia, Costa Rica, Cuba, Mexico, Paraguay, Peru, Uruguay and Venezuela.

[2] Austria, Denmark, Danzig, France, Great Britain, Ireland, Italy, Poland, Portugal, Russia, Kingdom of the Serbs, Croats and Slovenes, Spain and Switzerland.

[3] Belgium, Bulgaria, Czechoslovakia, France, Germany, Great Britain, Greece, Hungary, Italy, Palestine, Poland, Russia, United States of America.

Bacteriological Station, the School Polyclinic, the Child-Welfare Institute and a number of establishments and institutions in the vicinity of Belgrade.

The participants were then divided into four groups for the examination of institutions and services in the rural districts and smaller cities. The Ministry of Public Health provided a medical officer of health as a guide for each group in order that all details of the public health work seen might be explained.

The final conference took place at Geneva on July 5th to 8th, when Dr. Stampar explained the characteristics of health work under his charge and answered questions. The discussion was very illuminating and frank. It should prove valuable not only to the participants but also to the public health services of the Kingdom of the Serbs, Croats and Slovenes.

V. *Interchange in Japan restricted to Health Officers of Far Eastern Administrations* [1].

This interchange, the first in this area, was made possible by the generosity of the Japanese Government, which offered free transport to participants on all the Government railways. The group also visited the institutions and organisations for preventive medicine in Manchuria, and were transported free of charge by the Manchurian railways. The Japanese Government prepared a complete description of the organisation and administration of its State and local public health services, including the health organisations of certain areas in Manchuria and Korea. This document was published in English by the Health Organisation and distributed to the participants before the interchange opened. Descriptive pamphlets on Japan and booklets containing valuable information for foreign travellers were also circulated to the participants by the kindness of the Japanese Government.

The group met at Tokio on October 18th, immediately following the meeting of the Far Eastern Association of Tropical Medicine, which some of the participants were able to attend. Seventeen medical officers of health from eleven administrations took part. Some of the countries commissioned their chief medical officers. After a series of general lectures and conferences on the organisation and administration of the Japanese public health services, during which the participants were welcomed in warm terms by a number of prominent Government officials, including the Prime Minister, four groups left Tokio and proceeded to different areas in Japan for a detailed study of local conditions. The Japanese authorities were anxious to present to their guests as many aspects as possible of Japanese life, in the belief that public health work cannot be well understood without a knowledge of general conditions. For this reason, the interchange differed somewhat from the usual interchanges in Europe, as the greater part of the time was spent in studying the social conditions of the people in relation to hygiene and sanitation.

On November 16th the groups reunited at Tokio; on the 17th and 18th they again left for a continuation of the study of local conditions in Osaka, Nara, Kyoto and a number of other important towns. On November 22nd the groups arrived at Korea, where seven days were spent in a study of laboratories, hospitals, clinics and other like establishments. A similar period was spent in Manchuria. The group broke up on December 4th, after a final conference at Dairen, where the hospital, with its attached laboratories, and the quarantine services were studied in detail. Members of the Japanese public health services expressed the view that the interchange gave them an opportunity of surveying their own position, and furnished an impetus for reform and development.

Interchange for Specialist Health Officers.

I. *Interchange of Medical Inspectors of Labour.*

Plans for this interchange were made jointly by the Health Organisation and the International Labour Office. Medical inspectors of labour from nine countries attended [2]. The interchange was accompanied throughout by a medical officer of the staff of the International Labour Office. The usual conference at Geneva was held at the beginning instead of at the end of the study tour, as it was believed that the participants would receive greater benefit from their visits if they were acquainted with the work of the Health Organisation and of the International Labour Office and had a general knowledge of industrial and medical inspection in the countries it was proposed to visit. The programme of this conference included talks on the technical organisations of the League of Nations, labour legislation, the notification and prevention of occupational diseases and the sanitation of the workshop and factory.

On March 29th the group left for Belgium, where, under the direction of Dr. Glibert, Medical Inspector-General of the Ministry of Labour, three weeks were spent in the industrial districts. This stage began with conferences conducted by experts on the national legislation relating to the protection of labour and on the regulations governing industry. The last fortnight was devoted to visits to certain industrial establishments carefully selected as most representative of various risks incurred by workpeople or of technical hygienic and sanitary organisation in the prevention of occupational diseases.

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[1] Australia, Burma, Ceylon, China, Dutch East Indies, Federated Malay States, Hong-Kong, India, Indo-China, New Zealand, Philippines, Russia, Siam and the Straits Settlements.

[2] Belgium, Czechoslovakia, Great Britain, Holland, Japan, Poland, Russia, Kingdom of the Serbs, Croats and Slovenes, United States of America.

There followed a week in Great Britain, under the guidance of Sir Thomas Legge, Chief Medical Inspector of Labour in the Home Office; this period was spent in the study of English Law for the protection of labour and in visits to the Medical Research Council and the Industrial Fatigue Board. At Liverpool the Government station for disinfection of wool was examined and in the neighbourhood of Glasgow the party was able to observe a special industry, viz. the manufacture of oils from schist.

Leaving England, the participants proceeded to France, where at Lille, conducted by M. Boulin, Divisional Inspector of Labour, they visited certain factories and took part in conferences dealing with the industrial legislation of the country.

From France the group proceeded to the Netherlands, where, under the guidance of Dr. Kranenberg, Technical Adviser to the Director of the Inspection of Labour, conferences were held relating to the legislation of that country in so far as this affected the safety and health of the workers. Visits were paid to certain industrial establishments at Amsterdam and Eindhoven.

On May 4th the party held a final conference at The Hague before dispersal.

II. *Interchange of Medical Statisticians.*

(See page 16.)

III. *Interchange of Port Health Officers in the Mediterranean.*

In order to make this interchange as useful as possible, and in view of the international significance of port sanitation and practice, the candidates were supplied with as much information as possible on the sanitary organisation, administration and equipment of the ports it was proposed to visit. To obtain this a questionnaire had been sent to the port health authorities. The group had the advantage of being conducted by a member of the Health Committee, Dr. L. Raynaud. The tour began at Barcelona on November 10th, thirteen port health officers from eight countries participating [1]. The following ports were visited: Barcelona, Marseilles, Algiers, Genoa, Naples, Alexandria, Port Said, Haifa, Piræus, Salonika. The group was received most hospitably by the sanitary authorities of all the countries with ports on the journey, which placed every possible facility at the disposal of the participants. The object of the visit to each port was to study the methods of deratisation and disinfection of ships, the equipment available for the control of infectious diseases, the methods of handling emigrants, and the infectious disease situation. At the final conference at Geneva on December 22nd and 23rd, critical reports were read on the organisation and sanitary practices of each port visited and a full discussion of deratisation and disinfection of ships. One of the chief objects of the interchange was achieved—namely, to enable port health officers to come into closer touch with each other and to learn the methods practised in ports having maritime connection with their own. This should result in a greater sense of security and the more reasonable application of quarantine measures. Individual reports were submitted by each member of the interchange to Dr. Raynaud, who has been good enough to prepare a general report on the whole tour. Recommendations were made to the Health Committee in regard to the deratisation and disinfection of ships.

Individual Missions.

During 1925 a number of public health officers were given the opportunity of studying sanitary practices in other countries through the system of individual missions These are arranged according to the credits available and with due regard to the needs of the public health services and the ability of the candidates to profit by their studies. The programme is carefully arranged beforehand in collaboration with the public health authorities of the countries to be visited. The following is a list of the individual missions provided for in 1925:

The Deputy Director-General of the Australian Public Health Service came to Europe for a three-months' study of European public health conditions and practices.

The Director-General of the Public Health Service of New Zealand also studied special subjects for the same period in several European countries.

Two senior medical officers of the Czechoslovak Public Health Service carried on special studies in Central and Eastern Europe.

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[1] Algeria, France, Great Britain, Greece, Italy, Kingdom of the Serbs, Croats and Slovenes, Spain and Syria.

Two officers of the Indian Medical Service studied certain problems of applied bacteriology in selected European institutes.

Two malariologists from the Kingdom of the Serbs, Croats and Slovenes engaged in practical laboratory work, and two other medical officers from that country carried on a general study of public health methods and practice in other countries.

A Swiss medical officer made a general survey of the public health aspects of social insurance in Europe.

A Belgian medical officer made a tour of certain French departments where model public health programmes had been organised.

A health officer appointed by the Public Health Commissariat of the Union of Soviet Socialist Republics studied child welfare in several European countries.

A medical officer appointed by the Persian Government, in accordance with the recommendation of the Health Committee, began a six-months study of public health organisation in Western Europe.

Participants in collective interchanges were in some cases enabled to prolong their studies after the group had broken up, notably the Canadian and the Latin-American participants in collective study tours.

Programme of Interchanges adopted by the Health Committee for 1926.

In accordance with its usual practice, the Health Committee adopted a programme of interchanges for 1926 during the April (1925) session. Interchanges in Great Britain and Denmark were planned, each to include 15 participants. It was decided to limit the interchange in Great Britain to municipal health officers from large cities and to restrict the study to the area of London and the home counties. The interchange in Denmark was reserved for medical officers of health particularly interested in the solution of general problems of rural hygiene. The Health Committee also decided to approach the German health authorities with a view to holding a collective interchange of general medical officers of health in Germany. While the plan was well received by the German Public Health Services, certain obstacles intervened which would have militated against the complete success of the interchange, notably the extensive preparations for the health exhibition at Dusseldorf, the plans for the celebration of the 50th anniversary of the German Public Health Service, and the preliminary arrangements for the celebration of "Health Week" all over Germany. It was therefore decided to postpone the proposed interchange until 1927. The German health officials planned to hold a general conference of all interested departments to consider the programme early in 1926. The Health Committee decided to organise a collective study tour in West Africa in the interests of the Colonial Health Administrations of Belgium, France, Great Britain, Portugal, Spain and the Union of South Africa. The provisional programme included visits to Dakar, Bathurst, Bolama (Portuguese Guinea), Monrovia (Liberia), the Ivory Coast, Togo, Dahomey, Nigeria, the Gold Coast and Sierra Leone, in the order named, with a final conference at Freetown. The group would include 16 or 17 participants, and several of the administrations approached indicated that their chief medical officers would be selected. This interchange is of special interest because of the proposal of the French Government that an epidemiological bureau should be set up in West Africa to co-operate with the African Public Health Services in the prevention of epidemic and endemic disease and to collect and distribute epidemiological intelligence. The collective study tour will be utilised as a means of studying this proposal and of ascertaining informally the views of the participants, who will represent many of the administrations most interested.

Special Type of Interchange.

In order to eliminate some of the least desirable features of collective interchanges and to combine the advantages of individual missions and collective study tours, a new type of interchange was planned for 1926. It was decided to invite ten medical officers of health from four contiguous countries to participate. Each candidate will be selected because of his connection with some particular branch of public health work. After some twelve days of carefully planned individual specialist study, the participants will meet as a group and follow the usual initial stage of a collective interchange with group conferences and visits to institutions of general interest. The group will then disperse again for individual specialist study of four or five subjects and will meet at the end of each week for the exchange of views and general discussion. This plan will be followed in each of the countries visited, and the usual final conference will be held at Geneva with the participation of representatives from the countries visited.

Collective Study Tours of Specialists.

The Health Committee has decided to hold an interchange of sanitary engineers in Great Britain during 1926. It is proposed to invite some 15 sanitary engineers of State and Municipal Health Departments, who will study in England important questions relating to water supply,

sewerage and sewage disposal, and housing and rural sanitation. An elaborate programme has been prepared by the English sanitary authorities, which includes attendance at several important conferences of British engineering societies.

The next study of port health procedure and sanitary organisation will take place in 1926 in the North Sea and Baltic area. Some 12 to 14 port medical officers will be invited, and it is expected that the study will continue for from three to five weeks.

Budgetary provisions permitting an interchange of child-welfare specialists will be held in 1926. It is planned to include in the programme a study of the legislation of the countries visited with regard to the protection of infancy, in view of the interest shown in this subject by the Advisory Commission for the Protection and Welfare of Children and Young People.

The proposal of the Cuban delegation to the Sixth Assembly that an interchange be arranged between the technical personnel of institutes of tropical medicine in Latin America is described in another chapter of this report. The suggestion that it would be useful to arrange for an interchange of Ministers of Health or other Members of Parliament intimately connected with the public health services to visit, in company with the chiefs of these services, features of special interest in three or four countries, was considered by the Health Committee during 1925 and it was decided to obtain additional information before reaching a final decision.

Individual Missions.

Although the credits at its disposal were less than those for 1925, the Health Committee considered it would be possible to effect certain economies in the conduct of collective interchanges so as to reserve a certain sum for individual missions. It was decided that some of these missions should be allotted to public health officers of Far Eastern countries.

Chapter V.

SPECIAL STUDIES AND INVESTIGATIONS.

Other problems of international importance have engaged the attention of the Health Committee although their examination has not necessitated the establishment of technical commissions. Such studies may be of two kinds—preliminary enquiries with a view to the drawing up of a programme subsequently to be undertaken in connection with subjects affording wide scope for investigation, or studies of a more limited kind which can be satisfactorily carried out as the result of collating data obtained from the health administrations of different countries. The development of these enquiries will be briefly outlined.

Disinfection.

During the third Session of the Health Committee, Dr. Chodzko brought forward a proposal that an international enquiry on the question of disinfection should be undertaken. Dr. Chodzko called attention to the fact that the old methods of disinfection and the official regulations based on these methods no longer corresponded to the needs of modern science. Recent research and experience gained during the war had, in fact, proved that it was possible to make use of methods of disinfection which were simpler and less costly than those previously recommended, although quite as efficacious; the legislation of certain countries had already been modified accordingly.

After having shown that the revision of the present methods of disinfection would relieve State and local authorities of heavy financial burdens, Dr. Chodzko proposed that the Health Committee should instruct the Health Section to collect data dealing with the present practice in different countries in regard to disinfection and also the texts of the various regulations in force.

The Health Committee having adopted this resolution, the Health Section requested the health administrations of certain European countries to be good enough to entrust to experts the preparation of memoranda describing the position with regard to compulsory disinfection. A report relating to Germany was compiled by Professor Seligmann; that for Austria by Dr. Kaiser; for Belgium by Dr. Rulot; for the Kingdom of the Serbs, Croats and Slovenes by Dr. Tvanic; for Scandinavia by Dr. Haeslund; for Czechoslovakia by Drs. Kilhavy, Hrdlicka and Vrany.

Professor Chagas presented to the Fifth Session of the Health Committee certain preliminary observations on the value of the terminal disinfection (doc. C.H. 363). By "terminal disinfection" are meant the measures which are compulsorily applied to the home of a person who has contracted an infectious disease after his cure, his transfer to hospital, or his death. After having critically examined the experimental data on which is based the practice of disinfection as employed up to the present, Professor Chagas has arrived at conclusions which may be summed up as follows:

"The methods which have for their object the disinfection of contaminated premises by chemical agents are onerous and prevent sanitary staffs from concentrating upon the real sources of infection—that is to say, human beings. If it is desired to destroy germs existing in sick rooms, recourse must be had to mechanical processes of cleaning and to the action of natural agents which are prejudicial to the vitality and virulence of those germs. Such procedure will be far less onerous and very probably as effective as the employment of chemical agents. The basis of a sound prophylactic system should consist in the education of families in health matters in order to prevent the dissemination of germs recently excreted."

It is the intention of Professor Chagas to develop the views which we have just quoted in a memorandum which will be presented to the next session of the Committee and which will serve as the basis for future deliberations on this subject.

Leishmaniosis.

At its April session of 1925, the Health Committee received from Professor Pittaluga a statement showing that leishmaniosis is now assuming serious importance in Spain and the Mediterranean basin. The ætiology of this parasitic affection, which appears both under a visceral form as kala-azar and under a cutaneous form as "Oriental sore" and which is more prone to attack children than adults, has not yet been clearly established. The rôle played by dogs, by fleas, by bugs and by certain insects such as "phlebotomi" in the transmission of the disease has not yet been accurately defined.

On the proposal of Professor Pittaluga, the Health Committee decided to entrust to him, in collaboration with Dr. Raynaud, a study of Mediterranean leishmaniosis. To the next session Professor Pittaluga presented an epidemiological study of visceral leishmaniosis in Spain (doc. C.H. 368), while Dr. Raynaud contributed a note on the Oriental sore and kala-azar in North Africa (doc. C.H. 380). These reports show the large number of unknown factors involved in the

problem of leishmaniosis: as, for instance, if there is one or more than one parasite, the receptivity of animals other than the dog and the monkey, the rôle of animals as receptacles for the virus, the nature of the transmitting agents of the disease, etc.

The Health Committee having decided that it was desirable to continue and to complete this enquiry in the Mediterranean countries, Professor Pittaluga suggested a plan of investigation including, on the one side, statistical research in Spain, the South of France, Italy, Portugal and North Africa and, on the other, a topographical study of the foci of leishmaniosis in relation to the presence of dogs and "phlebotomi".

This investigation is now proceeding.

Future Studies.

During the course of the October session of 1925, the Health Committee decided to adopt the proposals put forward by some of its members suggesting that investigations should be made with regard to certain statistical and epidemiological aspects of the problems of leprosy, the unification of the processes by which the efficacy of lymph-vaccine can be tested, the sero-prophylaxy of measles and the epidemiology of scarlet fever. It would be premature to relate here the various stages of development reached by these enquiries.

Chapter VI.

PROPOSALS MADE BY GOVERNMENTS TO THE HEALTH COMMITTEE IN REGARD TO NEW STUDIES AND INVESTIGATIONS.

During the last two years, various proposals have been received from Governments which wished to take advantage of the facilities offered by an international health organisation in solving certain health problems. Many of the studies and enquiries of the Health Committee were started in response to such proposals. For instance, the Tuberculosis Commission began its study of the decline of tuberculosis mortality in order to be in a position to furnish certain information requested by the Government of the Kingdom of the Serbs, Croats and Slovenes, and the Sanitary Administration of South Africa is in correspondence with the Health Committee on the same subject. The Government of the Netherlands asked the Health Committee for information on the sanitary precautions exercised in ports of other countries, and this led to the preparation of a model convention which later was made the subject of an agreement between the Governments of the Netherlands and Belgium. The Government of Albania asked for the help of the Health Committee in the prevention of malaria, and an expert studied and reported on local conditions to the Malaria Commission, whose recommendations were adopted by the Health Committee and forwarded to the Albanian Government. A study of health conditions in Persia was undertaken at the request of the Government of that country, and a Persian health officer was given the opportunity of studying municipal health practice in certain Western States in order to give effect to one of the Health Committee's recommendations relating to the development of municipal health organisations in Persia. The Malaria Commission has been able to comply with the request of various Governments in regard to the prevention of malaria, notably in the case of Corsica, where a study was made and a detailed report presented to the French Government.

The Government of Greece asked for the help of the Health Committee in solving the problems created by the influx of refugees from Asia Minor, and the results of this assistance have been described elsewhere in this report.

PROPOSALS FOR NEW HEALTH WORK MADE BY VARIOUS GOVERNMENTS AT THE SIXTH ASSEMBLY.

Proposals by Governments for new and useful lines of enquiry on subjects of international importance have become more frequent recently. At the Sixth Assembly nine proposals for new work on the part of the Health Committee were presented by the delegations of eight States Members.

In its resolution approving the work of the Health Committee, the Assembly noted with satisfaction that " the Governments are more and more disposed to collaborate with the Health Organisation in matters concerning the prevention of communicable diseases and the improvement of the health conditions of the people ". The Assembly requested the Council to refer to the Health Committee for its consideration the following proposals, on the understanding that no expenditure would be involved beyond the estimates already submitted for 1926.

1. *Proposal of the Delegation of the Kingdom of the Serbs, Croats and Slovenes.*

" The Second Committee requests the Health Committee to study, from an international point of view, the measures that might be recommended to Governments, in the interest of public health, for the control of the manufacture and distribution of food supplies. "

2. *Proposal of the Cuban Delegation.*

" The Second Committee requests the Health Committee to consider the possibility of organising during the coming year an interchange of technical personnel in charge of institutes of public health and tropical medicine in the countries of Latin America. "

3. *Proposal of the Czechoslovak Delegation.*

" 1. In the interest of the economic, practical and efficient organisation of public health services, including national health insurance, the Second Committee requests the Health Organisation to undertake a comparative study of these aspects of health administration in various countries.

" 2. In view of the great interest attached to the collection of morbidity statistics, with special regard to the prevention of disease, the Second Committee requests that the Health Committee, among its other work, should include the study of a uniform international method of collecting information regarding diseases treated in hospitals.

" 3. The Second Committee recommends that the Health Committee should insert on its agenda a study of the conditions in which it would be possible to unify national pharmacopœias in so far as prescriptions relating to the compounding of drugs are concerned. "

4. *Proposal of the French Delegation.*

" The Second Committee, having in mind the gravity and the prevalence of endemic and epidemic diseases in West Africa and the international danger arising therefrom, recommends that the Assembly instruct the Health Committee of the League of Nations to study the possibility of establishing a sanitary and epidemiological bureau on the West Coast of Africa. "

5. *Proposal of the Italian Delegation.*

" In view of the present widespread prevalence of trachoma, which serious disease is one of the most frequent causes of blindness, the Second Committee of the Sixth Assembly recommends:

" That the Health Committee, with the approval of the Council, undertake an enquiry into the prevalence of trachoma in various countries and into the measures that have been adopted for its prevention. Having obtained this information, the Health Committee should be in a position to formulate recommendations and eventually to advise as to the most suitable and effective measures to be applied for the prevention of this disease. "

6. *Proposal of the Paraguayan Delegation.*

" The Second Committee, appreciating the value of the studies undertaken by the Health Organisation to secure the comparability of health statistics, recommends that an expert medical statistician be sent to a certain number of countries, notably in Latin America, to study, in collaboration with the competent authorities of those countries, the sanitary statistical methodology employed therein with the object of making comparable the health statistics of a still larger number of countries. "

7. *Proposal of the Venezuelan Delegation.*

" The Second Committee, desirous of strengthening the ties which should bind the Health Organisation of the League of Nations to national public health administrations, recommends to each Government the establishment of a special bureau within its health organisation, whose function it would be to ensure collaboration between the head of this administration and the Health Organisation of the League of Nations. It is desirable that the personnel of such special bureaux should already have collaborated with the Health Organisation of the League of Nations. "

During the October session of the Health Committee these proposals were studied in detail and resolutions adopted in regard to the nature and scope of the studies required to satisfy the wishes of the different Governments.

1. The Health Committee considered that from the study of foods proposed by the delegation of the Kingdom of the Serbs, Croats and Slovenes there might emerge certain international questions suitable for reference to the Office international d'hygiène publique, and requested the Medical Director to prepare a preliminary report in consultation with the Economic Organisation of the League. This work is being carried on by the Health Section, which will present a memorandum for the Health Committee at the April session.

2. The Health Committee decided to entrust the task of arranging for an interchange of technical personnel between institutes of tropical medicine in Latin-America to the Medical Director, in consultation with the Latin-American members of the Committee. As a preliminary step, negotiations are being carried on between the Health Section and the chiefs of these institutes in Cuba and Brazil.

3. The three proposals of the Czechoslovak delegation were dealt with by the Health Committee as follows:

(*a*) It was decided to include the study of health insurance in the programme of studies of public health administration in various countries, on which a number of reports have been published. The study of health insurance will include detailed consideration of the relations actually established or capable of being established between the insurance medical services and the public health services, and the financial considerations involved. The study is being carried on in consultation with the International Labour Office.

(*b*) The second proposal of the Czechoslovak delegation relating to hospital records as an index of morbidity was studied by the Health Committee, which requested the Medical Director to collect information on this subject in the course of the study of health insurance and other enquiries.

(*c*) The third proposal of the Czechoslovak delegation was postponed to a subsequent session of the Health Committee.

4. In the chapter on interchanges of public health personnel, mention is made of the collective study tour in West Africa, which is being utilised as an opportunity to study the proposal

of the French delegation in regard to the establishment of an epidemiological bureau in that area. Reports on public health administration in certain West African colonies are being collected in order to show whether it is feasible and advisable to set up such a bureau.

5. The study of trachoma proposed by the Italian delegation is being carried out by Doctor Lutrario, Doctor Jitta and other interested members of the Health Committee who have been requested to prepare reports on this subject. The Health Section has also collected a considerable amount of data on the prevalence of the disease in countries where it is notifiable, and a report will be submitted to the Health Committee in April.

6. The proposal of the delegation of Paraguay falls into line with the programme of the Health Committee to take such measures as will lead to the comparability of the vital statistics of all countries. In accordance with the wishes of the Health Committee, the Medical Director is studying the question whether this and other proposals of a similar character are advisable and feasible, with a view to such action as may be considered necessary.

7. The Health Committee, in commenting upon the proposal of the delegation of Venezuela on the establishment of liaison bureaux to ensure closer co-operation between the Health Organisation and the different public health services, noted with satisfaction that a number of countries had already established such bureaux, notably the Governments of Belgium, Czechoslovakia, Hungary and Roumania, and considered that such action resulted in a closer and more valuable relationship.

8. The proposal of the Government of the Netherlands to the Sixth Assembly which related to infant protection and mortality was referred to the Social and Health Committees. The latter requested the Medical Director to prepare a report on infant mortality and related subjects, and to include questions affecting the hygiene of school-children and legislation for the protection of illegitimate children.

[Distributed to the Council and the Members of the League.]

C. 252. M. 96. 1926, III.
(C. H./6th Session/P.V. revised.)

Geneva, May 25th, 1926.

LEAGUE OF NATIONS

Health Committee

SIXTH SESSION

Held from Monday, April 26th, to Saturday, May 1st, 1926.

LIST OF MEMBERS OF THE COMMITTEE

Dr. Th. MADSEN, *President*,	Director of the State Serum Institute, Copenhagen.
M. O. VELGHE, *Vice-President*,	Secretary-General of the Ministry of the Interior and of Health, Brussels.
Dr. Carlos CHAGAS, *Vice-President*,	Director of the Instituto Oswaldo Cruz, Rio de Janeiro.
Dr. N. M. J. JITTA, *Vice-President*,	President of the Health Council of the Netherlands, The Hague.
Professor Léon BERNARD,	Professor of Hygiene at the Faculty of Medicine of the University of Paris.
Sir George BUCHANAN,	Senior Medical Officer of the Ministry of Health, London.
Professor J. CANTACUZÈNE,	Professor at the University of Bucarest.
Dr. H. CARRIÈRE,	Director of the Federal Health Department, Berne.
Dr. W. CHODZKO,	Former Polish Minister of Health, and Director of the School of Hygiene, Warsaw.
Surgeon-General H. S. CUMMING,	Director-General of the United States Public Health Service, Washington.
Dr. A. GRANVILLE,	Late President of the Sanitary Maritime and Quarantine Council, Alexandria.
Professor Ricardo JORGE,	Director-General of Public Health, Lisbon.
Dr. A. LUTRARIO,	Late Director-General of the Health Department at the Ministry of the Interior, Rome.
Professor B. NOCHT,	Director of the Institute for Tropical Diseases, Hamburg.
Professor Gustavo PITTÁLUGA,	Catedratico de la Facultad de Medicina, Madrid.
Dr. L. RAYNAUD,	Inspector-General of the Health Service of Algeria, Algiers.
Dr. M. TSURUMI,	Representative of the Japanese Public Health Service.
Dr. L. RAJCHMAN,	The Medical Director, Secretary of the Committee.
Absent :	
Dr. Alice HAMILTON,	Associate Professor of Industrial Hygiene, Harvard Medical School, Boston.
Dr. P. MIMBELA	Professor of the Faculty of Medicine, Lima.
Professor Donato OTTOLENGHI,	Professor of Hygiene at the Royal University, Bologna.

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FIRST MEETING

Held on Monday, April 26th, 1926, at 3 p.m.

Present : All the members of the Committee, with the exception of Dr. Alice Hamilton, Professor Ottolenghi, Dr. Mimbela, Surgeon-General Cumming, Dr. Carrière and Professor Ricardo Jorge.

Senator POTTEVIN also attended.

202. Opening of the Session.

The PRESIDENT regretted the absence of Dr. Alice Hamilton and of Professor Ottolenghi, who was prevented from attending by ill-health. Dr. Mimbela would be unable to attend during the session ; Surgeon-General Cumming and Dr. Carrière would be arriving shortly. The President was happy to greet Dr. Granville, who for the first time was attending the meetings of the Committee, and also Senator Pottevin, Deputy-Director of the Office international d'hygiène publique.

Professor Léon BERNARD informed his colleagues that Professor Ricardo Jorge would attend the next meeting.

203. Adoption of the Agenda.

Replying to a question from Sir George BUCHANAN, the PRESIDENT explained that Professor Ricardo Jorge would present briefly and without discussion his report concerning the Conference of The Hague on smallpox and vaccine, as the discussion on this important question ought to be held over until a future session.

Sir George BUCHANAN hoped that this report would be officially placed before the Committee during this session, although he was of the opinion that it would be impossible to discuss it at present.

The PRESIDENT added that Professor Léon Bernard would likewise be satisfied to present without discussion a note on the Warsaw session of the Public Health Training Commission.

Professor PITTALUGA said he would leave it to the Bureau to decide at what moment he should present his note on Leishmaniosis.

After an exchange of views, *the Committee provisionally decided* the order in which it would examine the questions mentioned on the agenda (Annex 78).

204. Study Tour organised by the Health Committee in Mediterranean Ports : Report by Dr. Raynaud.

Dr. RAYNAUD read a summary of, and commented on, his report (Annex 79) stating that this text was only a résumé of the general opinion he had formed on the results of the Mediterranean voyage, as each of the participants would make a report on one of the ports visited. Moreover, certain studies could be presented on special points.

The PRESIDENT thanked Dr. Raynaud for his report and congratulated him upon the way in which he had directed the study tour. He opened the discussion on Dr. Raynaud's report, whilst drawing attention to the fact that fuller discussions would take place at the Paris Conference.

Dr. JITTA made certain observations on matters of detail :

Firstly, the report emphasised the fact that in certain ports, at Barcelona, in particular, the docks and warehouses were provided with rat-proof buildings. This system seemed to be the best. Nevertheless, it would be difficult, without undertaking new constructions which would be very expensive, to arrange existing buildings in this manner.

Secondly, on the subject of the accident which occurred at Trieste during a fumigation process with hydrogen cyanide, there was occasion to enquire whether in all countries, as in the Netherlands, the use of masks was obligatory.

Thirdly, he supported Dr. Raynaud's proposal regarding the value of finding, either by means of a Committee of experts or by other means, a uniform method for the use of hydrocyanic acid.

Dr. RAYNAUD replied that in fact the rat-proof system of construction was only applicable to new buildings. At Barcelona, the port service was autonomous, and had moreover large resources. The use of masks was obligatory everywhere. Nevertheless, arrangements were made, for example, in Spain, which rendered them unnecessary because of the precautions which were taken. The Trieste accident had claimed three victims of whom two had been fitted with masks.

Sir George BUCHANAN said that Dr. Raynaud's remarks were of great interest to the Committee. The final pages of the report contained an admirable doctrine to which he felt all would subscribe. He noted that the document was a note rather than a report ; it was an expression of the personal views of Dr. Raynaud and not a formal report submitted on behalf of the members of the collective study tour.

The question of quarantine regulations for the Hedjaz railway would be raised at the forthcoming International Sanitary Conference. It was very important that the mandatory Powers concerned should subscribe to a common agreement in order that the measures taken on the railway should be reasonably effective, and also to prevent, as far as possible, unnecessary delays in the transit of pilgrims. The port of Maan had been chosen for a quarantine station in Transjordania precisely because it was not on Hedjaz territory and could, therefore, be supervised by the mandatory Power.

He thought that Dr. Raynaud's observations on deratisation were perhaps a little pessimistic, especially when he asked : "What are the most effective gases for the destruction of rats and vermin ? What methods are best and least dangerous to man ? Are any of these methods likely to cause damage to goods and foodstuffs ? On what conditions should the vessel be fumigated ? Empty ? In cargo ? etc." The Committee should remember the advance already made since the last International Sanitary Conference. Most of these questions could already receive an answer which would be good enough for practical working purposes, though no doubt there was room for more research. He agreed that continued study of the methods of deratisation was necessary, but the Committee should remember that since the International Sanitary Conference of 1911-12, at which the Powers decided that it was desirable or necessary to deal systematically with rats on board ships, deratisation had been adopted on a very large scale, and there were several quite different methods, all of which were efficient. Moreover, much had been done, especially in America, with regard to the rat-proofing of vessels.

There were no facts before the Committee which would prejudice the proposal that each ship should be examined every six months to discover whether it was necessary for it to be cleared of rats, a proposal which must be submitted to the forthcoming Conference. The authorities at most of the larger ports were now perfectly capable of having rats destroyed in one way or another.

The PRESIDENT, in reply to Sir George Buchanan's observation, said that the report of Dr. Raynaud, as Dr. Raynaud himself had pointed out, was a personal one and was not in the same category as the report on the work of the Near East Commission.

Professor CANTACUZÈNE desired additional information on the quarantine centre of Maan. This was a land quarantine station and the Paris Conference would discuss the question, which was of great interest to countries bordering on Russia.

Dr. RAYNAUD replied that the work in this quarantine centre had only been begun, but that on the occasion of the last pilgrimage no health organisation, properly so-called, had yet been installed. From the time when the Palestine Government had extended its authority to cover this district, which was now included in the mandated area, the work was being carried out in a practical manner. As was the case at Tebuk, this quarantine centre would consist of a very large camp and quarantine would be compulsory.

Professor CANTACUZÈNE noted that this meant that the principle of compulsory land quarantine had been established. Whether it would be opportune to extend this practice to other cases was a question which would have to be discussed.

Dr. RAYNAUD, in reply to Sir George Buchanan, explained that, though effective means of deratisation might exist, the methods varied according to countries. It was necessary to discover a means of deratisation which would be really methodical and this was the object of the enquiry which he had proposed should be entrusted to a Committee. His report contained his personal views. He thought, however, that he had reproduced in a general way the views of the various members of the Mediterranean collective study tour.

Professor PITTALUGA said that, after discussing the question with his Spanish colleague, Dr. Mestre, who had been one of the members of the party, he was convinced that the Mediterranean tour had been one of the most interesting because of its effect on the health administrations. Some port doctors tended either to be guided too much by technical considerations or to yield too readily to the material interests of trade. The just mean between these two extremes would be found by means of co-operation of this kind, by a system of interchange visits similar to that over which Dr. Raynaud had presided and from which the participants would bring back very useful impressions to their own country. In the name of Dr. Mestre and of the Port Health Administration of Spain, he asked the Committee to take note of the great interest which the tour had aroused.

Would the special reports of the persons who had taken part in the tour be published by the Secretariat or by the authors themselves or by their Governments ?

Fumigation by means of hydrogen cyanide had been generally adopted in Spain for the disinfection of ships as the result of a very careful study carried out by the medical branch of the Health Service (port doctors). Reference might be made in this connection to the results which for a long time had been obtained empirically in the agricultural districts of eastern Spain from the use of hydrogen cyanide in the destruction of insects which were parasitic on fruit trees — in particular, on orange trees. There was no doubt that any process of this kind might result in accidents which could, however, be avoided if the regular precautions were taken. Speaking for the Port Health Administration of Spain, he declared himself

in favour of the process described by Dr. Raynaud, which would have to be compared with others in the way suggested by his colleague and perhaps under the auspices of the Health Committee.

The rat-proofing of docks and warehouses raised an important financial question. It would not be possible to remodel all such buildings in the Mediterranean, but at least all new docks must be built in a rational manner. There was too great a difference between one port and another. The question of their economic precedence predominated, although there were no principal or secondary ports from a sanitary standpoint. The necessity for defence was the same everywhere. The port administrations, public or private, must be persuaded to follow a fixed, and to some extent uniform, rule.

At Barcelona nearly all the docks had recently been remodelled or built and were constructed in accordance with the rules of sanitation. Moreover, in Spain most of the important ports were autonomous administrations (*Junta de obras del Puerto*), though indirectly dependent upon the State, which sent an engineer to direct the work. The State could, therefore, exercise complete authority during the construction of the docks, even from the hygienic point of view, through the intermediary of the Director of the Port Health Administration, who took part also in the autonomous organisation of the work of construction at the port.

M. Velghe thought it preferable to adjourn any detailed discussion of Dr. Raynaud's report until the reports of the participating doctors were before the Committee. He wished at the same time to emphasise the impression of satisfaction and confidence that the members had derived from their tour.

At a previous session it had been recommended that a central organisation should study the equipment of ports with the object of giving information to the various countries. The recent tour had been the best proof of the usefulness of having a more exact knowledge of the conditions under which the work of the health services of the ports was carried out. As a result, there were greater facilities and less formalities for commodities passing through ports which were functioning perfectly. There would yet result from such knowledge still greater progress, still greater uniformity in the application of the methods of disinfection and of deratisation, without going so far at present as a standardisation, which M. Velghe, for his part, could not accept.

As regards bills of health, Dr. Raynaud had stated that adversaries had been met everywhere. Had he met the same opposition regarding the institution of health books ?

Dr. Lutrario was delighted with the results of the tour, which were satisfactory in all respects, from the practical standpoint and from the standpoint of the confident and cordial relations which should inspire the work of the various port services.

In Italy the process of fumigation with hydrogen cyanide had been in use for six years in all ports, and accidents were the exception. In order to prevent their recurrence, rules regarding the use of toxic gases were being drawn up. It should be pointed out that the Trieste accident was the result of reckless courage on the part of three of the workmen, who went to the assistance of their comrade without having taken the necessary precautions.

So far as methods of fumigation were concerned, it would be of value at the right moment to adopt not an actual standardisation, but rules covering the different processes.

The opinions of Professor Canalis and Professor Puccinini, whilst highly authoritative, were, nevertheless, only personal opinions. The methods employed in Italy against the spread of epidemics were such, moreover, as to give every confidence. The following case could be cited. In 1910, whilst a cholera epidemic raged in Apulia, 100,000 emigrants left Naples without a single case of cholera appearing on the other side of the ocean. It should be pointed out that such results as these were to a great extent due to the unity of sanitary supervision in Italy.

The question of bills of health would be discussed at the Sanitary Conference. Personally, Dr. Lutrario was in favour of them, though he wished their existing faults to be rectified. Consular visas were required by the sanitary authorities of all countries, England included. It would be desirable to reduce the expenses which these documents entailed, but they were of great importance from the sanitary standpoint.

Dr. Granville agreed with the observations of Sir George Buchanan, of Professor Pittaluga and of M. Velghe. Dr. Raynaud's note was of particular interest in that it emphasised the fact that the Mediterranean mission had begun to dissipate the mistrust which existed between doctors in the different countries. At Alexandria, where he had met the mission, he had been struck by the cordial relations existing amongst its members.

There was no doubt that it was possible to destroy rats, but it demanded care and organisation. In particular, a ship should be disinfected throughout. The problem became more and more difficult from the fact that there was a tendency to adopt more generally the system of watertight compartments in the construction of ships. It was desirable to emphasise this point.

On the other hand, what confidence could be inspired by the examination of ships every six months ? The officers of a ship too often affirmed that there were no rats on board, while at the same time this statement was contradicted by the occurrence of cases of plague.

Dr. Granville was very sceptical concerning the results which might be obtained in a coastal quarantine station in the Hedjaz and gave an account of his experiences in the regions in question.

Senator Pottevin stated that the various processes, sulphuration, hydro-cyanisation and carbon monoxide, were well known, and had given rise to innumerable observations. It was not so much a question of a standardised process ; the value of a process depended

upon the method of its utilisation. In particular, it was not sufficient to exterminate rats only in some parts of a vessel. In the United States experiments had been carried out for a year in 1920-21 on the two processes of hydro-cyanisation and sulphuration, which had given substantially similar results. The processes were adequate, but were not always easy to apply. The actual method of catching rats was excellent, but it took time and required that all parts of the ship should be accessible. It must be left to the judgment of the health official, who had at his disposal a considerable number of well-known methods, to choose the best.

The Trieste accident, as Dr. Lutrario had pointed out, had been due to recklessness on the part of the rescuers. That was, moreover, the classical cause of accidents of this nature. So far as masks were concerned, their efficacy was complete. During the war, Senator Pottevin had carried out experiments bearing upon the protection afforded against hydrocyanic acid by simple carbon absorption masks. If necessary, it was easy to renew at each operation the small quantity of wood charcoal in the mask.

Dr. Raynaud testified that many experiments had been made with various processes, but their application was so irregular that they could not constitute a complete guarantee. It was not sufficient to insist in a convention that a ship should undergo deratisation twice a year. The extermination of rats ought to be carried out under conditions which should be defined. When a ship was loaded with separate cargoes, the extermination could be effected in loaded holds, but not when the cargo was, for example, corn. It was necessary to reconcile the different interests, those of commerce and those of hygiene, and that was the object of his report. It was possible that the requisite scientific knowledge was available, but it was necessary to determine how it could be applied in practice.

Senator Pottevin replied that, so far as application was concerned, each case was a special case. As a general rule, it had been admitted, in discussing the Convention, that a ship could only be considered as having been disinfected if the disinfection had been carried out when the holds were empty. For the sulphuration process, for example, it was necessary to determine the amount used and the duration of the operation; but the process to be used in each case was the concern of the health officers.

Dr. Raynaud raised the objection that there were not two countries nor two ports in the same country where similar systems were in use. If it were desired to render disinfection certificates interchangeable, it would be necessary to effect this according to rules which would have to be drawn up. Commerce itself demanded it, since it had to pay excessive freights due to repeated deratisation operations.

M. Velghe considered it useless to prolong the debate as there would be an early opportunity of reopening it. After the views which had been exchanged, he had the impression that there existed a mere misunderstanding, and that it would be easy to arrive at unanimity on the question of deratisation certificates.

Professor Nocht was entirely in agreement with Senator Pottevin. As regards the question of deratisation, experience and actual practice were sufficient; what was necessary was to develop the judgment of the port health authorities.

Dr. Rajchman, in reply to the question asked by Professor Pittaluga on the subject of the publication of the reports of the medical officers who had taken part in the tour, pointed out that the publication of such documents necessitated the approval of the administration by which the doctor concerned was employed, of the competent authorities of the country visited and of the Health Committee.

He would suggest that the Committee should entrust Dr. Raynaud with the selection of those reports or parts of reports which should be published; steps would then be taken to obtain the approval of the authorities concerned.

M. Velghe asked that, pending the decision of the administrations interested, the reports should be roneographed for the personal use of the members of the Committee.

The Committee agreed to the above proposals.

205. The Problem of Infant Mortality and Child Welfare.

Professor Léon Bernard explained that, as he had been detained by work in connection with the University in Paris, he had been unable to attend the session of the Advisory Commission for the Protection and Welfare of Children and Young People. Some of his colleagues, whom he had asked to replace him, had also been unable to attend. He asked Dr. Norman White, who attended the session, to submit a statement to the Committee.

He added that, when he had found that it was impossible for the Health Committee to be represented at the session of the Advisory Commission, he had written to the Chairman of that Commission pointing out the necessity of avoiding any duplication of work and of submitting to the Health Committee any health questions. This had been done.

At the request of Dr. Rajchman, the note of the Secretariat on infant mortality and protection of children (Annex 90) was read.

The letter sent to the President of the Health Committee by the Chairman of the Advisory Commission for the Protection and Welfare of Children and Young People (Annex 80) was read.

With regard to the resolution of the Child Welfare Committee contained in Annex 90, M. VELGHE noted that the Secretariat was called upon to proceed with "the collection or analysis of legislative texts". Even if the text of this resolution were final, it seemed necessary that it should be accompanied by an interpretation, for the legislation adopted on this subject by countries did not represent the total sum of their work in the field of the protection of children. In Belgium, for example, legal provision was made for medical advice in respect of infants but not for pre-natal centres, of which, nevertheless, there was a considerable number. The same was true of France. Were the Committee to give effect to this resolution, it would have to attach an explanation to it stating that legislation should comprise all existing measures adopted in conformity with the law and owing their origin to public or private initiative. Such an interpretation would be necessary if accurate statistics were to be obtained.

Dr. CHODZKO agreed. The situation in Poland was the same as in Belgium. He would, nevertheless, ask that the proposal be put forward in the form of a recommendation of the Health Committee. Further, he asked what action had been taken on Resolution No. IX, adopted at the fifth session, of which the last paragraph read as follows :

"The Health Committee . . . draws the attention of the competent services and organisations of the League of Nations to the value, in connection with health questions, of collecting documentation relating to legislation concerning illegitimate children and the welfare measures adopted on their behalf."

Had the question of the protection of illegitimate children been discussed by the Advisory Commission ?

Finally, Dr. Chodzko greatly regretted that, in an enumeration of experts in child welfare, account had not been taken of Eastern European countries, where the conditions were very bad and where a great effort was being made to remedy them.

Senator POTTEVIN supported the remarks of M. Velghe. In France, pre-natal consultations were very numerous. He mentioned, in particular, the organisation created during the war by Professor Pinard in the interests of women working in factories. Nevertheless, there was no legislation on this subject. On the other hand, it would be desirable to bear in mind the delay allowed for declaration of birth. This delay was 24 hours in France, but three days in certain countries, with the result that cases of death occurring during these three days could be recorded as cases of still-birth, which falsified the statistics.

M. VELGHE drew attention to the fact that this was an entirely different and, moreover, very difficult question if examined from the international standpoint.

Dr. Norman WHITE said that it was pointed out to the Child Welfare Committee that in many countries there was very little legislation on the three specific points referred to in the resolution which it had adopted and that it was of little use to collect legislative texts without at the same time considering infant welfare activity in the various countries. If this were done, however, a very formidable task would have to be undertaken. He pointed out that the programme of the Advisory Commission for the Protection and Welfare of Children and Young People had been submitted to the Health Committee for its opinion as well as for its assistance in carrying it out. The Health Committee was therefore at liberty to suggest any modifications in the programme of work which were considered advisable.

With regard to the question raised by Dr. Chodzko concerning the mortality of illegitimate children in different countries, the Health Section was collecting statistics on infant mortality in general, including that of illegitimate children, covering a long period of years and in many countries. Much work had already been done in the Section, but the data had not yet been analysed.

Dr. JITTA thanked the Committee for the attention which it had given to the proposal on child welfare submitted to the sixth Assembly by the Dutch delegation. He agreed entirely with the remarks of M. Velghe : in the Netherlands it was usually private societies, subsidised, however, by the State, which organised child welfare. Nevertheless, legislation forbade expectant mothers to work in factories during the last month, etc. For the rest, there were bureaux to which women could go for advice during the last months.

On the subject of the Liaison Sub-Committee suggested by the Child Welfare Committee, Dr. Jitta had as yet no definite opinion. He would point out, however, that it would be necessary to define what was meant by "experts". They would not be purely honorary, but would be expected to do effective work. This condition should be clearly expressed in the requests for collaboration which would be addressed to them. Finally, it would be of value to instruct one or several members of the Health Committee to form, if not a Sub-Committee, at least some kind of Liaison Committee with the experts.

Professor Léon BERNARD fully agreed with Dr. Norman White on the fact that the Health Committee retained full freedom of opinion. Its first action should be to show that in the question of child welfare there was no connection between existing organisations and measures on the one hand and legislation on the other. It would be desirable to send a reply on this particular point to the Child Welfare Committee during the present session.

Referring to the remarks of Dr. Jitta, Professor Léon Bernard stated that the necessary precautions should be taken to ensure that the experts chosen would do useful work. It would, moreover, certainly be easy to find these experts in the different countries. On the other hand, he did not associate himself with the principle of multiplication of Sub-Committees.

The members of the Liaison Sub-Committee should not only be responsible to the Advisory Commission; their provisional decisions should be submitted for the approval of the organisations which they respectively represented. Personally, if he were called upon to represent the Health Committee on the Liaison Sub-Committee, he would not be able to commit it in any way without submitting to it the points in question. It was therefore to be hoped that in the reply of the Chairman of the Advisory Commission the standing of the members of the Liaison Sub-Committee would be well defined.

Sir George BUCHANAN said that the Child Welfare Committee apparently desired information on the legislation to be collected in the various countries with reference to infancy. There was no objection to collecting this legislation; it was a question which could be kept separate from the remainder of the problem. With regard to infant mortality in general, he thought that the Health Committee was in almost the same position as it had been at the previous session. At that session it had instructed the Secretariat to begin the investigation of the subject and to submit its results, when ready, to the Committee. He quoted from the Minutes of that session:

> "Sir George BUCHANAN wished to add, as regards this proposal and others which the Committee was to discuss after reports had been received from the Secretariat in April next, that it would be difficult adequately and briefly to discuss the questions involved unless the preparatory documents had been circulated some time in advance. He would therefore suggest that, if such documents could not be prepared a sufficient time in advance, the discussion should be postponed.
>
> "The PRESIDENT said that the Committee was in entire agreement on this point."

The Secretariat, he gathered, was still engaged upon the preparatory stage. The Committee had not yet received the result of the work of the Secretariat, *e.g.*, the statement on the bibliography of the subject, the analysis of statistics examined, etc., for the simple reason that the Secretariat had not yet had sufficient time.

The question of child welfare in general had been very closely studied in almost every country in the world, and some countries now had very complete investigations on record. Other countries did not keep adequate statistics, and it would therefore be useless to consult them. The first point, therefore, was to discover what countries could give the necessary information. He would therefore suggest that the Secretariat should continue the summary of useful literature, and, if more information were required, that it should apply to the official public health authorities in the countries concerned. He was not in favour of arbitrarily choosing certain countries from which to ask for experts.

Dr. TSURUMI said that in Japan there was a considerable amount of information available on infant mortality and child welfare. Why was the proposed enquiry to be restricted to Europe?

Professor Léon BERNARD pointed out that, in the text proposed by the Advisory Commission a programme had been submitted to the Health Committee with the object of obtaining its advice and assistance. The Health Committee was therefore quite free to express its views.

With regard to Sir George Buchanan's observation concerning the unequal value of statistics on infant mortality, he would point out that the question was not merely one of statistics. If the Health Committee merely confined itself to the collection of statistics on infant mortality, it would be choosing the wrong path. What was essential, if the whole problem of child welfare were properly to be attacked, was to obtain the views of the medical world itself. Its opinion was of enormous importance, and worth far more than any list of figures. In France, for instance, there were many private organisations capable of giving a very great deal of information on the subject.

He feared that certain public health authorities might be unable to obtain the information which would be useful to the Committee. It was essential to take a broad view, and it was therefore necessary to choose experts who would be able to obtain that quality of information which it was necessary for the Committee to possess and which was often outside the powers of a Government department. It should be remembered that in many countries, France included, the problem of child welfare had first been attacked by private organisations, private persons and the medical world in general. It was only at a later date that the public authorities had stepped in and provided subsidies. A medical enquiry was therefore essential.

M. VELGHE agreed with Professor Bernard. With regard, for instance, to the question of pre-natal centres raised in the resolution of the Advisory Commission, such a phrase limited the subject to too great an extent. The term "pre-natal centres" meant one thing in one country and another in another. What was wanted was a comprehensive view of everything that was done for the expectant mother.

He would endorse the views of Professor Léon Bernard with regard to the use of statistics. It was impossible to obtain any definite and conclusive information by this means alone. To judge of the efficacy of a private institution, such, for instance, as a maternity home, by the statistics which it published, would be to risk obtaining a quite false impression. It was therefore necessary for the Committee to obtain the services of experts who would give

it the benefit of their own knowledge and experience. In order that the Committee should be able to obtain a clearer view of this complicated question, he would propose that a report upon it should be drawn up by one of its members and submitted at some future date.

Professor PITTALUGA said that in Spain a Government Institution had just been created, which was expected to prove of great use in the near future. This organisation was known as "The Institute for the Science of Maternity and Childhood" and was part of the General Health Service; it was maintained by special credits and was under the direction of Professor Suñer, of Madrid.

In order to simplify the manner in which the Committee would deal with the problem, he would make the following suggestions :

1. That the proposed committee of experts should be presided over by the representative of the Health Committee on the Child Welfare Committee.

2. In its reply to the Advisory Commission for the Protection and Welfare of Children and Young People, the Committee should state that it did not consider it sufficient for the Liaison Sub-Committee to report only to the Child Welfare Committee.

Dr. RAJCHMAN said that a unanimous desire had been expressed that the Health Committee should study the problem of child welfare. The Health Section had therefore commenced with an investigation of the statistics on infant mortality, not with the idea of limiting the enquiry merely to such statistics, but in order to have a basis on which to work. Much statistical material had been assembled, and a member of the Section had been at work for six months on the question. The result of these studies would be submitted to the Health Committee in due course.

It was necessary to take a further step, if the problem were to be properly attacked. It was essential to obtain the views of experts, and to that end he considered that the six experts proposed by the Bureau should be approached. They would be drawn from the following countries : France, Germany, Great Britain, Italy, the Netherlands and Norway. They would be able to draw up a programme of international work necessary for the solution of problems of infant mortality and child welfare. He would point out that the proposal to consult experts did not mean the establishment of a new Commission.

It was somewhat difficult to understand in what manner the Liaison Sub-Committee proposed by the Child Welfare Committee would carry out its work. One of its chief duties should be to meet before the session of the Child Welfare Committee and discuss the agenda of that Committee.

Professor Léon BERNARD reminded his colleagues that the Child Welfare Committee was composed of very different elements — lawyers, women, doctors, etc. He agreed with Dr. Rajchman in thinking that the Liaison Sub-Committee could easily draw up an agenda for the Child Welfare Committee.

Sir George BUCHANAN considered that the position was simplified by the observations made by the Medical Director. Unless he had misunderstood the position, the Committee was still in the stage of searching for a programme of work which it could justify as work which had not already been done and as work requiring to be conducted by an international body, such as the League's Health Organisation. The experts were to help in this search. He saw no possible objection to that proposal save that in the case of certain countries, Great Britain for example, it would be better for the Committee to approach the Government department or departments concerned rather than itself to nominate the expert. He urged, however, that the request to be made to the experts should be something more than a mere request for suggestions of such subjects which, in the opinion of the expert, or of the Government administration, required international study.

The Committee should not forget the enormous variety of factors which influenced infant mortality. To give a few examples: infant diarrhœa and its prevention by removing the sources of excremental contamination and by securing the destruction of flies ; pure milk, instruction of mothers ; infant-welfare clinics and social conditions of all sorts. If the letter sent by the Secretariat happened to reach an enthusiast on the destruction of flies, or the provision of pure milk, or the establishment of clinics, etc., that enthusiast would certainly demand that his particular panacea should be studied "internationally". He might make this demand without appreciating the fact that no international comparison on this subject could have the same value as a thorough national enquiry. He might even make it without realising that no enquiry, national or international, would ever succeed in demonstrating the exact value of his remedy among a host of other good remedies.

Sir George Buchanan urged therefore that the experts, whether appointed individually or by Government health administrations, should be asked not merely for suggestions but for arguments in support of their suggestions. The arguments should show why the problem in question needed international research and why it could be more effectively studied by the use of the machinery which the Health Organisation of the League could set in motion than by an ordinary investigation. When proposals supported in this manner were placed before the Committee and when its members had had time to consider them, the discussion would be really fruitful, and what the Health Organisation was asked to do with regard to infant welfare might then be something which would prove of real use to public health.

Dr. JITTA thought, with Dr. Rajchman, that the liaison between the Health Committee, the Child Welfare Committee and the Liaison Sub-Committee could easily be maintained.

It was better not to approach the experts by correspondence in the first place. They should be invited to a preliminary meeting, in order to discuss their programme among themselves.

Dr. TSURUMI understood that the investigation would not be limited to Europe.

Dr. RAJCHMAN replied in the affirmative.

The proposals of Dr. Rajchman, as amended by Sir George Buchanan, were adopted.

206. Budget for the Year 1927.

M. VELGHE submitted the budget (Annex 99). He pointed out that the increase was small, amounting merely to the difference between Frs. 1,030,515 and Frs. 988,165. The increase was due to the normal increment in salaries and to a slight addition to the amount set aside for publications. The publications of the Health Committee were increasing in interest and importance. He would point out that the budget had been unanimously adopted by the Bureau and he hoped that it would be received with the same unanimity by the Committee.

In reply to Sir George Buchanan, Dr. RAJCHMAN explained that the staff of the Singapore Bureau was only temporary, and that its salaries were paid by the Rockefeller Foundation. The increase in the item for salaries of the permanent staff at Geneva was due to the appointment of a German Member of Section. Until Germany entered the League, the salary of this member would be paid by the Rockefeller Foundation.

Sir George BUCHANAN agreed that the addition of a German member to the Health Section was of importance. He hesitated to accept any increase in the budget for the salaries of the staff, especially now that the Health Committee was likely to require more money for special enquiries in the Far East. In view of the fact, however, that the proposed increase was small, he would make no objection to it.

The budget was adopted.

The Committee instructed Dr. Rajchman to regroup the items, if the Supervisory Committee, to which the budget would be submitted, deemed it desirable to do so.

207. Appointment of a Drafting Committee.

Sir George BUCHANAN and M. VELGHE were appointed members of the Drafting Committee.

208. Telegram of Sympathy to Professor Ottolenghi.

The Committee approved the text of a telegram sent on its behalf by the President to Professor Ottolenghi.

SECOND MEETING

Held on Tuesday, April 27th, 1926, at 3 p.m.

Present : All the members of the Committee, with the exception of Dr. Alice Hamilton, Professor Ottolenghi and Dr. Mimbela.
Senator POTTEVIN also attended.

209. Revision of the International List of Nomenclature of Causes of Death.

Mr. Loveday, member of the Economic Section of the Secretariat, took his place at the Committee table.
A note by the Medical Director on the revision of the International List of Causes of Death was read (Annex 94).

Mr. LOVEDAY, referring to the subject of the co-operation existing between the Economic Committee and the Health Committee, made a statement bearing on the following three points :

1. The machinery set up for the establishment of statistics.
2. The reasons determining the adoption of this machinery by the Economic Committee.
3. General observations.

The problem which confronted the Economic Committee consisted in examining the possibility of persuading Governments to adopt more uniform methods allowing comparison to be made between certain kinds of economic statistics. With this object in view, it had delegated three of its members to get into touch with three representatives of the International Statistical Institute. These six persons constituted a selection committee, which proceeded

to choose twelve statisticians expert in the particular questions in which the Economic Committee was interested. These experts constituted what was known as the "Preparatory Committee". They represented neither Governments nor the International Statistical Institute, but were chosen on account of their individual capacities and of their special knowledge. The function of this Committee was to lay down general principles for application by Governments in the compilation of national statistics.

The resolutions adopted by the Preparatory Committee were submitted to the plenary conference of the International Statistical Institute. This Institute, which had not, properly speaking, a fixed headquarters, was a strictly private organisation formed of about two hundred members which met in conference every two years in different capital towns. The Conferences of the Institute gave definite form to the resolutions and forwarded them to the Economic Committee. The Economic Committee in its turn examined them quite freely and without in any way regarding them as final. As an example, as a result of the first agenda three different problems had been examined.

(*a*) *Commercial Statistics.* — The Economic Committee approved the resolutions prepared by the Preparatory Committee and adopted by the Institute and forwarded them to the Governments for their approval and comment.

(*b*) *Price Indices.* — The Economic Committee did not accept the resolutions as they were presented, and forwarded them to the Governments simply for information and without inviting their views on the subject.

(*c*) *Mineral Statistics.* — The Preparatory Committee failed to deal with this question, and the Economic Committee adopted certain resolutions which had been approved by the Imperial Mineral Resources Bureau and forwarded them to the Governments in the same manner as commercial statistics.

The Economic Committee adopted this system of collaboration for various reasons.

In the first place, the International Statistical Institute included the majority of the Directors of the Central Statistical Offices of the various States, or Directors of the Statistical Offices of the Ministries of Commerce. They included, therefore, particularly competent and well-placed persons.

In the second place, the Institute was founded with a view to promoting the international comparability of statistics.

Thirdly, this procedure was very economical from the point of view of the League of Nations, since the Conferences of the Institute entailed no expense to it.

Fourthly, the Institute, an entirely private scientific organisation, was composed for the greater part of officials, so that resolutions approved by the Institute had every chance of being adopted by the Governments, since the same officials who discussed them as members of the Institute would have to examine them again later in their official capacities.

Finally, the great reputation possessed by the Institute added weight to the resolutions adopted by it.

The resolutions drafted by the Preparatory Committee had not been seriously modified at the Conferences of the Institute. But those Conferences had given valuable indications as to the possible difficulties which might be met with later in getting the resolutions adopted by the various Governments.

Mr. Loveday added that the Institute was largely composed of economic statisticians, but was relatively weak in other branches of statistics.

The President thanked Mr. Loveday for his explanations, which would be most useful for future collaboration.

Professor Léon Bernard wished to comment upon the note which he had drawn up. His proposals and explanations would be greatly facilitated by Mr. Loveday's observations, for which he personally thanked him. The members of the Health Committee had for long known of the International Statistical Institute which was a private organisation without official character, and the relations of which with Governments were merely technical or courteous in character. In passing, it was desirable to correct a remark made by Mr. Loveday. The Institute had headquarters and a secretariat established at The Hague. For the rest, it comprised an office of which the Chairman was at the moment M. Delatour.

It was correct to say that the Institute was composed primarily of economists and that the medical element was barely represented. After his preparatory work and the death of M. Bertillon, the Institute continued to be responsible for the revision of data on the causes of death. At the same time, conscious of the omission referred to by Mr. Loveday, the Institute had realised the necessity of surrounding itself with technical experts and had invited the Governments to appoint such experts. Several replies were received, of which a certain number were negative, in particular, it would appear, that of the British Government.

In the course of a purely unofficial meeting convened by M. Delatour, the latter introduced a certain number of French medical personalities to form part of the Committee of Technical Experts. As the Health Committee, however, had previously decided to interest itself in the question, and in order to avoid duplication, Professor Léon Bernard had thought that the simplest solution would be for the Institute to use the Health Committee as a Committee of Experts. This suggestion had been welcomed by M. Delatour and his colleagues, the more so as such co-operation had its precedents ; for example, in 1922 a Mixed Commission to examine the question of the unification of economic statistical methods had been composed of members appointed by the Economic Committee and by the International Statistical

Institute. Further, in April 1925, the International Labour Office, following this example, had formed a Mixed Committee composed of members appointed by the International Labour Office and by the Institute with a view to the examination of various questions relative to the methods employed in labour statistics. Consequently, Professor Léon Bernard had prepared the note which he would read and in which, referring to the proposal of M. Velghe to offer to the Institute the collaboration of the Health Committee and basing his action on the afore-mentioned precedents, he requested the Committee to invite the Medical Director to get officially into touch with the Institute, with a view to establishing jointly the general outlines for co-operation in connection with the preparatory work for the revision of nomenclature upon the causes of death which would be the work of a future conference.

M. VELGHE stated that he had not changed his point of view and that he was still in favour of co-operation with the Institute. Mr. Loveday's speech had shown the value of concentrating efforts towards a single goal. This was particularly true in connection with the work of revision of nomenclature. At the same time, it must not be forgotten that certain factors would not be dependent upon the Health Committee. On the one hand, the revision would be carried out through the medium of an international conference which would establish new nomenclature. On the other hand, the preparatory work of the Conference would be confined to the Institute which had had the advantage of dealing with the question in the past and which reasonably expected to continue the work in the future. If it were correct that statisticians dealt with the question, it should not be forgotten that in this sphere the medical element prevailed over the statistical. The Institute could not therefore deprive itself of the advice of a group of experts who would prepare the conference in advance in such a way as to avoid the repetition of certain difficulties which had arisen at the previous Conference, which had been presented with certain more or less improvised and fortunate proposals.

The Institute had made individual overtures to certain members of the Health Committee, whilst the Health Committee had itself already decided to undertake the question. It was probable that the Institute would be glad to receive from the Health Committee a wider and more stable co-operation. M. Velghe strongly approved the proposal of Professor Léon Bernard that the Medical Director should explain to the Institute the views of the Committee, showing that the Committee possessed all the necessary means for bringing the work to a successful issue, that it would not be possible to find a better solution, and that the Committee willingly offered the Institute its complete co-operation.

Professor Léon BERNARD wished to explain that if the Institute had personally approached certain members of the Committee there was nothing out of order in this procedure, because the Institute did not know at the time that the Committee as a whole had already decided to deal with the question. Though being unable to commit the Institute, the preliminary conversations to which he had referred made him think that, if his proposal were approved, the Institute would gladly welcome the Health Committee's offer of co-operation.

Sir George BUCHANAN remarked that it was difficult to form an immediate opinion upon the complicated questions of procedure which had been raised before the Committee. The British Government had already accepted the decision that the Health Organisation of the League of Nations should be responsible for the preparatory work of the revision of the International List of Causes of Death, this decision having been approved by the Council of the League. The British Government had already asked that the valuable American suggestions should be circulated, as well as any suggestions which might come from other countries.

In the revision of this list it was not so much a question of modifying the general system according to which the various countries kept their vital statistics, as of making necessary modifications of detail. He referred in this connection to the value of the handbooks on national vital statistics that had already been prepared under Dr. Greenwood's direction. They were being added to and furnished valuable material by which it was possible to interpret the meaning of statistics in different countries. These monographs would facilitate the work of the next Conference.

The parallel between the work of which Mr. Loveday had spoken concerning commercial statistics, price indices, etc., and the work in which the Committee was interested was not very close. It referred to entirely different questions in a sphere which had been studied by certain countries for more than a century. The British Government would probably see no necessity for a Mixed Commission, not that it had any objection to co-operation with the Institute or to inviting proposals from the latter, but it would hold that the responsibility should rest entirely with the Health Committee of the League of Nations.

Dr. JITTA emphasised the inconvenience of the existing methods, which made comparison between different countries a difficult matter. It was hardly likely that the Institute had any intention of modifying fundamentally the existing nomenclature, but it was essential to revise it in accordance with modern ideas. Dr. Jitta fully agreed with M. Velghe and Professor Léon Bernard. He had been personally approached by the Institute with a view to his participation in the preparatory work of revision of the nomenclature, but he had wished to postpone his reply until the Committee had expressed its opinion. He was glad of the present discussion, which would no doubt permit of future co-operation.

The Institute was undoubtedly a private organisation, but it must be borne in mind that the work of revision had been entrusted to it by the French Government, which had convened the previous Conference. In this connection, Dr. Jitta referred to the conditions under which, after the death of M. Bertillon, the French Government had entrusted the Office international d'hygiène publique with the revision of the nomenclature and into which had slipped certain

errors owing to the interruption of M. Bertillon's work. The Institute would undoubtedly attach great value to the co-operation of medical statistical experts. He knew unofficially that a proposal from the Health Committee to this effect would be warmly received by the Institute.

Dr. CARRIÈRE informed the Committee that the Swiss Federal Statistical Office was trying to adapt its nomenclature of causes of death to the international nomenclature. This adaptation could not be carried out without difficulty, but Dr. Carrière considered that he could assure the Committee that Swiss statistics might for the future be usefully compared with those of other countries.

The Federal Statistical Office, which had suspended the publication of its statistics in 1920, had now renewed its publication and was making use of the new nomenclature. It would, however, be premature to make any immediate observation arising out of this work as regards the future revision of the international nomenclature. Such observations would be formulated and revised later and submitted to the proper quarter.

As he had already remarked, there was no question of entirely remodelling existing methods in the future work of revision, for a certain number of States already possessed excellent institutions dealing with statistics of the causes of death. When, however, the Swiss nomenclature was being adjusted to conform with the international nomenclature, it had been possible to note that the authors of the international nomenclature had perhaps paid too much attention to the statistical and not enough to the medical point of view. It was principally with the medical side that the future revision should deal. It was for this reason that Dr. Carrière entirely agreed with M. Velghe and Professor Léon Bernard when they asked that the Health Committee, which possessed the necessary competence, should be closely associated with the work of the revision of nomenclature and that the International Statistical Institute should be approached in order to ensure this co-operation. Dr. Carrière wished once again to express the hope that the future nomenclature established as a result of the work of revision would be drawn up along broad lines so that it might continue in force for a certain time. Too frequent amendments complicated considerably the work of the statistical offices. Thus, in Switzerland, for instance, as he had already said, the publication of annual statistics had been suspended in 1920 while waiting for the new nomenclature which was in course of preparation. It might appear somewhat strange if it were necessary to think already of amending it so shortly after its publication.

Dr. RAJCHMAN said that it was clear from the discussion, as was the case at the October session, that the Committee wished to deal with the question itself. In certain countries, for example, in Germany, the adoption of the 1920 list had been attended by many difficulties.

As Governmental responsibilities were in question, it was desirable that inter-governmental organisations, such as the Health Committee, should take in hand the preparatory work of revision. The Institute, through M. Bertillon, had been largely responsible for the preparation of the list and it was rational that it should continue to deal with it up to a certain point. There would nevertheless be inconvenience if the Governments were placed in touch with the Institute on the one hand and the Health Committee on the other regarding this matter. Co-operation was necessary, but it was questionable whether the method of a Mixed Commission was the best. Past experience in the matter had not been very fortunate.

There was a further possibility, which consisted in preparing for each session a report describing the technical work undertaken and containing the views expressed by the Governments. There would be no difficulty in communicating such a report to the Institute in time to obtain its comments, and the Committee could then proceed to its discussions on the basis of its own work and of that of the Institute.

Professor Léon BERNARD noted that the discussion showed no fundamental differences of opinion. It would therefore be easy to arrive at an understanding. Sir George Buchanan had raised questions of procedure and questions of substance. These latter were premature because they must be dealt with by those whose duty it would be to study the problem. Nevertheless, as his British colleague had pointed out, there was no question of entirely reorganising the nomenclature.

It had to be borne in mind that certain health administrations had services of long standing, but it was necessary from time to time to effect adjustments of a medical character — not too often, no doubt, as Dr. Carrière pointed out, but it would be difficult to lay down now fixed periods for revision. Fifteen or twenty years might well pass before fresh causes of death need be introduced. On the other hand, in a few years many new ideas might appear. Ten years ago, who would have thought of introducing into the list epidemic encephalitis or ictero-hæmorrhagic-spirochætosis, for example ? Care should be taken not to assign to this revision a rigid and, so to speak, administrative periodicity.

Dr. RAJCHMAN enquired whether the Institute was officially entrusted with the preparation of the Conference.

Senator POTTEVIN replied that the Institute would necessarily prepare for the Conference; they should be held in Paris every ten years. They had been inaugurated under the initiative of M. Bertillon, acting in the name of the Institute ; this latter had remained, up to a point, the depository of the decennial conference. If the Institute was to-day obliged to call for the assistance of experts, it was because death had robbed it of the services of M. Bertillon. The Institute had, therefore, certain rights which it held both traditionally and from the fact that the French Government convened every ten years the Conference for revision.

Professor Léon BERNARD considered that the Committee could not at present form an opinion as to the method of co-operation with the Institute. If it had proposed a Mixed Committee, it was for the reason that precedent had been quoted for it. At the same time, Sir George Buchanan had observed, with reason, that the problems were not comparable. It would be desirable to request the Medical Director to examine, with the Institute, what the method of co-operation was to be, and merely to lay down the principle of this co-operation in such a way that, whilst leaving to the Institute its historical rôle, the prerogatives of the Health Committee would be respected.

Dr. TSURUMI stated that, as he had not yet been informed of the Japanese Government's opinion on this subject, he was unable for the moment to express any official view. He personally was inclined to think, however, that the present International List of Causes of Death did not satisfy the requirements of Japan. It was, moreover, desirable to remark that the causes of death were of course not the same in different countries. He expressed, in consequence, the desire that the revision of the list should be truly international in character.

Sir George BUCHANAN considered that the solution proposed by Professor Léon Bernard was satisfactory. He understood that the suggestions received from the different Governments or experts would be communicated not only to the other Governments but to the Institute. It should be borne in mind that the Committee was dealing with a work in course of execution, and he considered it of first importance that the different proposals for modification of the International List should be communicated to the various Governments as soon as they were received.

The PRESIDENT approved this view.

Professor Léon BERNARD read a draft resolution, the text of which reproduced the last phrase of his note.

Sir George BUCHANAN approved this text.

The resolution was adopted in the following form:

"The Health Committee authorises the Medical Director to get officially into touch with the International Institute of Statistics in order to ascertain, with the Institute, the possible basis for co-operation in the preparatory work entailed by the revision of the International List of Causes of Death to be dealt with by the future Conference."

210. Public Health Problems in the Far East and Work of the First Session of the Advisory Council of the Singapore Bureau.

Dr. RAJCHMAN gave a résumé of, and commented upon, his report of his voyage in the Far East (Annex 81).

The PRESIDENT expressed, in the name of all his colleagues, the opinion that the Medical Director had admirably carried out the task which had been confided to him and congratulated him upon his interesting and masterly report, which raised a number of questions for discussion by the Committee.

The Medical Director had clearly brought out the necessity of contact with the Far East. He had well explained the present situation in China, and had admirably described the considerable work done in Japan. Since the existence of the Health Organisation, the members of the Committee had been able to appreciate the importance of the co-operation of their Japanese colleagues. The Committee would be unanimous not only in voicing its admiration of the work done in Japan, but also in manifesting to the Japanese Government its gratitude for the assistance rendered to the mission sent by the Health Committee. His colleagues would likewise certainly be unanimous in thanking Dr. Brook for the work which he had carried out at the Singapore Bureau.

Dr. TSURUMI read the following observations upon the report of the Medical Director :

"I wish to express my profound gratitude and sincere congratulations to the Medical Director for the way in which he has carried out his mission in the Far East and for the work he has done in the course of his tour, particularly in Japan.

"At the last session of the Health Committee I remarked that the interchange of public health personnel in Japan would constitute tangible evidence of the health work of the League of Nations. In fact, as a result of the final conference of that interchange tour, the work of the Health Organisation of the League is now appreciated and better understood, not only by the health authorities, but also by the medical world of Japan. Hence has arisen the desire to create and maintain closer relations between the League of Nations' health work and that of my country.

"I desire to thank the Medical Director for having drawn attention not only to the good points but also to the shortcomings of public health administration in Japan. His criticisms are welcome and will be turned to profit as soon as circumstances permit.

"I am particularly grateful to him for having established a plan of co-operation between the Health Organisation of the League and my country.

"A Co-ordination Committee has been set up in Japan which should ensure that this liaison will be profitably maintained. I hope that all members of the Committee will give their unreserved support to the suggestions made.

"I am glad that the Medical Director made direct reference to the geograghical situation of Japan, which causes us to be constantly menaced by epidemics of infectious diseases, particularly cholera. This fact explains the great interest taken by the Japanese administration in all questions of quarantine and port health procedure."

Discussion upon the report of the Medical Director was adjourned until the next meeting.

THIRD MEETING

Held on Wednesday, April 28th, 1926, at 10 a.m.

Present : All the members of the Committee, except Dr. Alice Hamilton, Professor Ottolenghi and Dr. Mimbela.

211. Public Health Problems in the Far East and Work of the First Session of the Advisory Council of the Singapore Bureau (continuation).

Dr. GRANVILLE said he had read many accounts of travels in Japan, but the authors, who were naturally travellers who had spent very little time in the country, either made no mention of hygiene or else gave vague statements of an unreliable nature. He had therefore been very strongly impressed by, and interested in, the medical details in the able report of the Medical Director. At his (Dr. Granville's) age one read a good deal, understood a certain amount, and remembered very little. Nevertheless, certain conclusions emerged from this report which particularly interested him. One was the question of infant welfare in Japan. Someone had said that, if he were born again, he hoped that it would be in Japan — the children's paradise.

A further point concerned the dietary questions. He had no idea of the general extent of the use which was made of raw foodstuffs in Japan ; the results and difficulties of this partially raw nourishment were extremely interesting from the hygienic standpoint.

He would like to have more complete information concerning typhoid fever, which prevailed in an endemic form. The general use of excreta as manure must evidently contribute to the diffusion of this disease. There were many points worthy of study in connection with the endemic distribution of this disease on which more information would be welcomed.

The remarks on the treatment of venereal diseases formed likewise a most interesting part of the report. It was a question which had been to some extent avoided in Europe, perhaps owing to the terror inspired by the evil of the "police des mœurs". He would be glad to have more complete information concerning the application of the law upon the subject of affected women and upon the results obtained. This study was very difficult in Europe, where the collection of scientific data was unfortunately too often mixed up with sentimental questions.

M. VELGHE thanked Dr. Rajchman for his excellent statement upon which he congratulated him. He admired equally the Japanese people, who, in the space of seventy-five years, had effected a radical transformation and had brought themselves into the vanguard of civilisation, even in the matter of hygiene.

This said, he wished to make certain observations which, however, in no sense diminished his admiration. In principle, he entirely approved of the co-operation proposed by Dr. Rajchman, but the detailed acceptance of the proposals formulated on this subject frightened him a little. This method of co-operation was capable of considerable development. The Medical Director had spoken also of China. Was not the Health Committee adopting a costly plan, without being sure of the necessary resources ? M. Velghe recognised, however, the full importance of this question and the benefit which the whole world might derive from this new opportunity for study.

Further, he wondered whether the questions concerning tuberculosis, infancy, and venereal diseases should not come directly before the competent Commissions without passing through the Co-ordination Committee of the Far East, the work of which would be limited to questions concerning quarantine and epidemic diseases. On this matter he noted that he was in agreement with his colleagues.

Finally, he saw possibilities of studying Japanese questions concerning which full and exact information was available, but he doubted whether it was possible, with inadequate resources, to undertake research upon the medical condition of a country of four hundred million inhabitants such as China. Nevertheless, M. Velghe wished to express confidence in the resourcefulness of the Medical Director.

As regards the means of co-operation offered by Japan, this represented a combination which was infinitely superior to the liaison bureau which had been in question the previous year. M. Velghe hoped that it would be possible to adopt it in various other countries, whether they were represented or not in the League of Nations. This procedure made it possible to count upon private enterprise, which in many countries gave better results and inspired far more confidence than administrative action.

Dr. Chodzko wished to join with his two colleagues in congratulating Dr. Rajchman and the Japanese Government. He would be glad of enlightenment upon certain points concerning the health organisation in Japan.

Firstly, it was to be noted that the large towns had an autonomous health service, whilst in the case of lesser communities such services were carried out by officials of the State. What were the functions of the State and the municipal organisations respectively ? Could information also be given concerning the development of health organisations in the different provinces ? One item in the budgets of the provinces referred to the isolation of the insane. What did that mean ?

Being an old and devoted friend of Japan, he wished to give his frank impressions regarding the occurrence of disease. In the first place, the regulations concerning venereal diseases were very strict. It was to be noted that, in 1923, 58,000 prostitutes had been treated in the hospitals, their treatment covering one million hospital days, *i.e.*, an average of 18 days per case. Now there was no venereal disease which could be treated in such a way as to make it no longer contagious in so short a time. Moreover, the large number of cases appeared to show that the treatment was inadequate. The number of dispensaries available for the population was likewise insufficient.

As to the general death rate, a regular increase was to be noted between 1912 and 1922, the proportion having risen from 19.9 to 22.3. Similarly, the infantile death statistics had increased from 15.9 to 17.5.

At first sight, M. Chodzko was struck by the fact that, in the beginning, sanitary control had shown the best results in connection with the fight against cholera, plague, opium, etc. This system, however, had proved insufficient later, and it did not quite meet the present situation ; perhaps it was not sufficiently elastic to allow full liberty of action to health officers who in nearly all countries were gradually freeing themselves from the influence of the police and the administrative authorities.

The laws concerning tuberculosis seemed to be based entirely upon the system of sanatoria. Perhaps it might be well to draw attention to the fact that this was a very costly system which had not given the results expected, and was gradually being replaced by the system of dispensaries. In general, the impression prevailed that Japanese hygienists would be in a position to obtain very remarkable results if they regained their liberty of action.

Dr. Rajchman found considerable difficulty in replying to the questions of Dr. Chodzko. He had only stayed in Japan a few weeks and he could not pretend that he had been able to study in all its details the admirable Japanese health organisation. He referred Dr. Chodzko to a treatise of 280 pages on the health organisation in Japan, distributed six months ago, which contained replies to practically all the questions which had just been raised.

The present debate was not concerned with the details of the health system in Japan. It referred to the methods of collaboration to be established between the Health Organisation of the League and its Japanese colleagues.

To reply to two points of detail, Dr. Rajchman said that the word "insane" had been introduced owing to an error in translation. The passage referred to the isolation of aliens.

He had had a very definite impression that venereal diseases were as well treated in the Japanese hospitals as in the best Western hospitals. He would like to remind the Committee that it was Professor Hata who had collaborated with Ehrlich in the discovery of salvarsan.

The relatively high level of general mortality was certainly due to several very complex factors. Every effort was being made by the Japanese health service to effect a reduction in the death rate and the enquiries were being carried out in a very satisfactory manner.

The President asked his colleagues not to allow the discussion to wander to the question of the value of the health administration in Japan.

Professor Léon Bernard said that compliments would be superfluous, but he wished to say that he shared the admiration of his colleagues for the considerable progress which had been made by Japan. Never before had social and public habits been modified in so complete and fortunate a manner in so short a time.

The co-operation proposed would undoubtedly be fruitful both for Japan and for Europe. He would quote, for example, the data concerning the high death rate from tuberculosis amongst the women in Japan as compared with the men. It might be imagined at first sight that this arose from a difference in social life and this fact might be coupled with that of the high death rate amongst women in convents. In every way, the situation which the Committee was considering was peculiar to Japan and might furnish matter for fresh study.

Similarly, useful research could be carried out regarding the relation between maternal nursing and infantile tuberculosis, inasmuch as artificial feeding had for a long time been unknown in the country, which nevertheless suffered as much from infantile tuberculosis as any other.

Likewise, the campaign against venereal diseases in Japan was founded entirely upon State regulation. This situation offered a field of activity which was particularly favourable for a decision of the conflict between abolitionists and anti-abolitionists. Professor Léon Bernard said he would like to mention in passing that he was definitely in favour of abolition and that he considered that the system of State regulation had failed.

He identified himself with the proposal concerning the granting of two individual scholarships, since he was sure that nothing would be more acceptable to the Japanese, whose mental brilliance was above all praise. He himself was in constant touch with a large number of Japanese doctors who came to consult him on tuberculosis. One of these possessed a quite

remarkable method of cross-examination, which had given him, Professor Léon Bernard, an opportunity of learning what was happening in Japan in exchange for the information which he himself had furnished. The institution of travelling scholarships would therefore serve for the instruction both of Europe and of Japan.

Sir George Buchanan shared in the appreciation of Dr. Rajchman's report already expressed by his colleagues. As regards the action to be taken in Japan, he thought the proposal concerning scholarships and interchange of experts a good one. For the moment, the Rockefeller contribution would make it possible to solve immediate budgetary difficulties, but it was necessary to bear in mind that acceptance of the proposal was bound to lead in future to demands for the extension of similar privileges to other countries in the Far East and in other distant parts of the world. There might be in consequence an increasing demand for expenditure on these special interchanges and travelling scholarships, at the same time as a diminution in the Rockefeller contribution, owing to the fact that the Rockefeller Foundation might consider that its contribution had already been successful in launching the system.

With regard to China, it was proposed to relieve her of an antiquated system of medicine and to introduce new methods founded upon a quarantine service in the principal ports. This scheme merited consideration, especially as it was favoured by the Medical Counsellor to the Legation at Peking, Dr. Gray. It seemed to be based on the idea that the funds necessary for its realisation would be raised by taxes on imports and shipping — in other words, that the foreigner would pay. Would it not be better to begin the education of the Chinese in public health by telling them that, if they wanted modern hygiene and medicine, they would have to pay for them themselves ?

Moreover, the thesis that modern medicine and hygiene were to be introduced into China by means of quarantine seemed rather illogical. Why should the first step be the adoption of measures to exclude diseases from the countries which already had the benefit of modern medicine ? If, on the other hand, the object was not to benefit the Chinese, but the foreigner, by preventing the export of Chinese infection, the argument seemed to fail. It was difficult, in the present circumstances of China, to understand the philanthropic motives which urged that country to concern herself in the safeguarding of the sanitary position in India, in Japan and in the Straits Settlements. Otherwise, Sir George Buchanan was in no way hostile to the idea. He only desired that the League of Nations should act on a valid and well-established plan, should it presently be asked to consider a request from the Chinese Government. If the medical regeneration of China, through the help of the League, was to constitute one of the great events of the future, the responsibility of the League was very heavy and the plan proposed to it should be closely considered.

Dr. Nocht said he shared the gratitude and admiration which had already been expressed regarding Dr. Rajchman's report.

He would be glad to have information on the special question of cholera. It had been said that this disease was very frequently imported to Japan. On the other hand, the Chinese were bacteriologically examined ; such an examination took place only in the large ports. Did cholera spread in spite of this examination or did it spread only in the small ports where there was no examination ?

Dr. Lutrario desired to give the consent of silence to the congratulations extended to the Medical Director and to the admiration shown for the remarkable regeneration of Japan. He wished to enquire if the veterinary service in Japan were connected with the State health administration or with the Department of Agriculture. In Italy, the law had always retained the veterinary service within the health service of the State. In other countries the plan adopted was quite different and this service was allied to the Department of Agriculture.

With regard to the remarks of Dr. Granville on venereal diseases, he wished to mention that in Italy the law required that the hospital and treatment expenses should be met by the State, and gave patients the right to the strictest anonymity. The results, as regards the prevention of venereal diseases, had been very satisfactory as a consequence of the application of this principle, which dominated all the legislation in the country regarding this matter.

Dr. Jitta wished to express his admiration for the clarity of Dr. Rajchman's report and for the remarkable results which he had been able to obtain so quickly. He agreed with the principle that collaboration should at present be confined to the establishment of quarantine in China. The Chinese situation caused him some anxiety, and he could not help thinking that "charity should begin at home". China had an immense coast-line with innumerable uncontrolled ports. It was necessary to proceed cautiously in this sphere and to offer assistance to the Chinese authorities in the interest of the country itself and also for the protection of the countries of the East.

Professor Pittaluga considered it superfluous to say how much he appreciated Dr. Rajchman's remarkable report. He thought that the Committee should immediately extract from it those suggestions which could be put into effect. The first referred to the interest which a scientific study of the Japanese health organisation would have and to the advantages that would result from co-operation between Europe and Japan. This question brought into action the whole health policy of the League of Nations and gave rise immediately to budgetary problems, but this ought not to prevent the acceptance of an interesting and productive programme for collaboration. Professor Pittaluga thought this point could safely be entrusted to the experience and prudence of Dr. Rajchman.

There was a large number of questions in connection with which this system of collaboration would be of the greatest value, not only in Japan but also in Europe. Thus, plague and cholera could not be suppresed unless a real administrative and scientific agreement were concluded with the peoples of the Far East. Similarly, the study of nutrition was of extreme importance. Generally speaking, the large health institutes almost always overlooked it. There was now an exceptionally good opportunity of carrying out a profitable enquiry under particularly favourable circumstances in countries where the feeding of the people kept a certain amount of uniformity.

Again, the health budget of the Manchurian Railway administration was a remarkable example of the way in which a private organisation could become an effective substitute for Government initiative. The railway companies of the West might extract from this a most valuable lesson. It should not, therefore, be thought that Europe could give everything to the Far East ; on the contrary, she had much to learn from it.

Finally, Professor Pittaluga drew attention to the fact that it was necessary for holders of scholarships to undertake a preliminary examination of the social, moral and political life, etc., of the people whose health organisation they proposed to study. It was essential to have an open mind and to avoid the application of preconceived ideas which were unsuited to entirely different conditions. This called for a complete adjustment, the importance of which should be emphasised, so long as the unification of the world had not been effected, a condition which Professor Pittaluga hoped never to see.

In conclusion, he believed that the Committee was unanimously in favour of this co-operative scheme. He personally was of opinion that the Medical Director should have all the confidence which was his due for the development of this work.

The PRESIDENT drew attention to the fact that it was considered that in Japan vaccination was more strictly controlled than in any other country in the world, since it was required every five years. Nevertheless, smallpox was fairly prevalent there. It had been explained to him that vaccination was not in reality as general as the documents appeared to indicate. He would like to have further information on this point.

Professor Ricardo JORGE wished to add his congratulations to those already expressed. He awaited with interest the forthcoming report from Dr. Wu-Lien-Teh, whose previous works admitted the duality of bubonic and pneumonic plague, a theory which Professor Jorge had held for a long time. Some remarkable research work, including that of Dr. Tsurumi, had been done in Japan on Manchurian plague, and this was a fresh proof of the advance which Japanese science had made. Professor Jorge himself had forty years ago held up as a model to be followed, the reform in medical teaching accomplished in Japan.

Dr. TSURUMI warmly thanked those of his colleagues who had made observations concerning the health organisation in Japan ; they would be of the greatest use. He reserved the right to present later on his own views concerning the quarantine service in China.

Dr. RAJCHMAN returned in the first place to the question of child-welfare ; he would furnish additional data in a few weeks.

As regards the problem of diet, Professor Pittaluga had quite rightly emphasised its importance. The Health Committee was certainly glad that Professor Saiki would give some lectures in Europe. In the meantime, he would place at the disposal of the members of the Committee the publications of the Institute which was directed by Professor Saiki.

The problem of the influence of contact on the spread of typhoid fever was a complex one. Dr. Rajchman did not possess sufficient data to make it possible to discuss the matter at present. It was a point regarding which technical co-operation with Japan would undoubtedly yield useful results. Reference was often made in Japanese hospitals to beriberi as being a complication of typhoid fever : the contrary, however, was the case.

The question of venereal diseases was extremely complicated. He would furnish full data concerning, in particular, the reply of the Japanese Government. This was one of the problems in connection with which the granting of individual study scholarships proposed by Japan would give the best results.

The examination of individuals suspected of being carriers of cholera had already been described in Dr. Norman White's report. It was not subject to uniform rules, and it was in Manchuria that it was exercised with the greatest rigidity. The problem was complicated by the fact that transport was carried on largely by means of junks.

It was evident that co-operation with the Far East should proceed by stages. At present, Dr. Rajchman proposed the publication of two monographs a year on this problem of international health. Thanks to the generosity of the Japanese Government it had been possible to save a considerable sum, so that this publication would entail no additional expense. Moreover, the budget as just adopted by the Supervisory Commission would make it possible to provide credits for this publication.

As regards individual study scholarships, he reminded the Committee that this principle had already been accepted for Australia and New Zealand. During the coming year it would be possible to restrict the programme somewhat and reserve a certain proportion of scholarships for the countries of the Far East.

With regard to China, it was preferable to limit the debate to a specific question. The Chinese authorities had decided to consider the desirability of requesting the League of Nations to continue the study begun by Dr. Norman White. This, therefore, was no new measure.

Sir George BUCHANAN remarked that what was really required was the inauguration in China of some system of hygienic education by the establishment of a quarantine service, and this was a measure which required considerable premeditation.

Dr. RAJCHMAN recalled that China possessed no preventive medical system. A small group of Chinese doctors, strongly supported by European and American doctors, wished to create a number of centres of instruction. The Chinese Government was proposing to approach the Health Organisation of the League with a view to an enquiry into the health organisation of Chinese ports. This would involve technical work which was within the competence of the Health Committee. It was encouraging to note that the Chinese authorities realised that they could only carry out imperfectly the sanitary control of the ports. This meant completing a task which had already been partially accomplished. If this work resulted in the improvement of public health and in the laying of one of the corner-stones for the introduction of modern medicine into China, it would be of considerable importance and interest. If the Chinese Government made this request to the League of Nations, it would mean nothing more than sending a technical expert to make an enquiry. Further, it would be logical, so far as funds were available, to reserve a few study scholarships for a year or two for Chinese doctors entrusted with the sanitary control of the ports. If the task of facilitating the application of modern medicine into a country of four hundred million inhabitants could be undertaken, such a work would in itself justify the existence of an international public health organisation. This was no philanthropic motive on the part of the Chinese Government, but a typically international problem.

In conclusion, Dr. Rajchman proposed an adjournment of the question whether the activities of the Health Committee should be extended later on to other countries of the Far East, until the proposals concerning the Singapore Bureau were discussed.

Dr. TSURUMI, in reply to Dr. Lutrario, stated that the veterinary administration was dependent upon the Department of Agriculture. He thanked Dr. Rajchman for having been good enough to reply to the questions raised by his report on Japan. He for his part would present at the next session a document on typhoid fever.

M. VELGHE was glad to have called forth the explanations made by Dr. Rajchman, which threw a veil over the machine while inviting the Committee to put a finger to the wheel, and warning it at the same time that various obstacles prevented the use of the whole arm, which they would be at liberty to call into action later on.

For his part, M. Velghe would willingly support Dr. Rajchman's suggestions and was sure that this example would be followed by his colleagues. When once the financial objections were overcome, he was convinced that the measures proposed would prove of considerable advantage in the Far East, as well as in Europe. Thanks to the intermediary of hygiene, it would be possible little by little to arrive at a better mutual understanding of the Asiatic and European mentalities. He, therefore, readily accepted the proposals made in the report. The financial questions would be dealt with as and when they arose.

Sir George BUCHANAN asked for information concerning the Chinese Government's request, and the means whereby it would be met if and when received.

Dr. RAJCHMAN pointed out that the procedure was clear. It would consist of a request addressed in the first instance to the Council of the League which would ask the advice of the Health Committee.

The Committee would have to examine the question in all its details and take such decisions as it considered useful.

Sir George BUCHANAN hoped that, if and when this communication arrived, it would immediately be communicated to the members of the Committee to allow them the time necessary for reflection and enquiry.

Dr. RAJCHMAN replied in the affirmative.

The PRESIDENT stated that the question would be considered in due course by the Health Committee.

FOURTH MEETING

Held on Thursday, April 29th, 1926, at 10 a.m.

Present: All the members of the Committee, with the exception of Dr. Alice Hamilton, Professor Ottolenghi and Dr. Mimbela.

212. Collaboration in the Work of the Advisory Commission for the Protection and Welfare of Children and Young People : Draft Resolution by Professor Léon Bernard.

Professor Léon BERNARD explained that, in the draft resolution which he had drawn up in agreement with M. Velghe and Sir George Buchanan, he had distinguished between two subjects :

1. The communication by the Advisory Commission for the Protection and Welfare of Children and Young People to the Health Committee of a programme which it had

drawn up and a request for the Committee's opinion on it. As a result of the discussions which had taken place he proposed to the Advisory Commission an addition to its original plan.

2. The resolution in which the sixth Assembly entrusted to the Committee a definite task in connection with which experts would have to be appointed.

The following draft resolution was read:

"The Health Committee, having considered the resolution adopted in March 1926 by the Advisory Commission for the Protection and Welfare of Children and Young People, decides :

"1. To thank the Advisory Committee for having transmitted to it for consideration and advice the programme which it has drawn up.

"2. To ask the Health Section to collaborate with the Social Section in collecting and classifying the documentation desired by the Advisory Commission concerning legislation relating to the three questions dealing with the protection of infants (pre-natal services ; infant welfare centres ; the care of infants in their own families or placed out in other homes).

"3. To draw the attention of the Advisory Committee to the fact that the state of legislation dealing with these three questions would only give, in the majority of countries, an incomplete picture of the actual measures taken, and that consequently it would be desirable that the Secretariat should add to the documentation on the subject of legislation the collection of information regarding official and private organisations which deal with these matters.

"4. To continue to collaborate with the Advisory Commission, through the intermediary of Professor Léon Bernard, who will represent the Health Committee on the Advisory Commission as well as on its Liaison Sub-Committee.

"5. To empower the Medical Director to invite a limited number of experts or public health administrations in different countries to suggest the directions which the Health Organisation of the League could most usefully follow in making international enquiries, in conformity with a resolution adopted by the sixth Assembly, on the subject of infant mortality and its causes, taking into account :

"(i) The nature of the information which the Health Organisation is in a specially advantageous position to obtain, and

"(ii) The need for avoiding the international investigation of subjects which can be elucidated more effectually by national enquiries.

"6. To communicate this resolution to the Advisory Commission for the Protection and Welfare of Children and Young People."

A discussion ensued with regard to paragraphs (i) and (ii) of Article 5 regarding the principles to be taken into consideration during the proposed enquiry. It was suggested that the experts should be asked, when proposing investigations, to take into account :

"(i) The nature of the information which the Health Organisation is particularly qualified to obtain, and

"(ii) The need for avoiding the international investigation of subjects which can be elucidated more effectively by national enquiries."

Professor Léon BERNARD drew the attention of Sir George Buchanan, on whose initiative these two paragraphs had been introduced into the resolution, to the fact that the text adopted by the Assembly only mentioned alimentation in its relation to infant mortality.

M. VELGHE endorsed this remark. He added that the new paragraphs were very vaguely worded, and it might be asked why the Committee did not confine itself to the terms of the mandate assigned to it by the Assembly.

Sir George BUCHANAN said that he attached particular importance to the observance of the principles contained in the two paragraphs and he thought they had been accepted by M. Velghe and Professor Léon Bernard. An expert with some special hobby of infant feeding would naturally want to press that hobby on to the League of Nations. Usually, he had much better go on working at it himself in his own country. The Health Committee should avoid international doctrines of infant feeding. There was a mass of knowledge already, and new knowledge would come by research which was individual or national.

Professor Léon BERNARD said that he and M. Velghe were of the opinion that the only thing to be done was to propose the appointment of experts in order to assist the Committee in performing the definite and limited task entrusted to it by the Assembly. This proposal could not give rise to any difficulties of an administrative or governmental nature, or any other kind. The two paragraphs in question could therefore be omitted.

Dr. RAYNAUD supported this suggestion.

Sir George BUCHANAN agreed that the remainder of paragraph 5 after the words "of infant mortality and its causes" should be omitted, provided it was understood that in making the enquiries account would be taken of the principles contained in the two paragraphs.

It was agreed that Sir George Buchanan's observations would be noted in the Minutes.

The resolution was adopted in the following form :

"The Health Committee, having considered the resolution adopted in March 1926 by the Advisory Commission for the Protection and Welfare of Children and Young People, decides :

"1. To thank the Advisory Commission for having transmitted to it for consideration and advice the programme which it has drawn up.

"2. To ask the Health Section to collaborate with the Social Section in collecting and classifying the documentation desired by the Advisory Commission concerning legislation relating to the three questions dealing with the protection of infants (prenatal services; infant welfare centres; the care of infants in their own families or placed out in institutions or in other homes).

"3. To draw the attention of the Advisory Commission to the fact that the state of legislation dealing with these three questions would only give, in the majority of countries, an incomplete picture of the actual measures taken, and that consequently it would be desirable that the Secretariat should add to the documentation on the subject of legislation the collection of information regarding official and private organisations which deal with these matters.

"4. To continue to collaborate with the Advisory Commission, through the intermediary of Professor Léon Bernard, who will represent the Health Committee on the Advisory Commission as well as on its Liaison Sub-Committee.

"5. To empower the Medical Director to invite a limited number of experts or public health administrations to suggest, after study of the question, the directions which the Health Organisation of the League could most usefully follow in making international enquiries, in conformity with the resolution adopted by the sixth Assembly.

"6. To communicate this resolution to the Advisory Commission for the Protection and Welfare of Children and Young People."

After an exchange of views *it was agreed* that the Medical Director should take steps to secure the collaboration of experts belonging to the following countries—France, Germany, Great Britain, Italy, the Netherlands and Norway — after consultation with the representatives on the Health Committee of the countries in question. In view of his special competence in this connection it was hoped to obtain the assistance of Professor von Pirquet.

213. Work of the Public Health Training Commission : Session held at Warsaw.

Professor Léon BERNARD read the note (Annex 83) which he had drawn up regarding the session of the Commission held at Warsaw and which he had amended as a result of the discussion that had taken place at the later meeting of the Public Health Training Commission.

The PRESIDENT, on behalf of the Committee, congratulated his Polish colleagues on the excellent work they had been able to do in the country.

Dr. TSURUMI also congratulated Dr. Chodzko and Dr. Rajchman. He had no doubt that the institution created by the Polish Government with the help of the Rockefeller Foundation would continue to develop and would contribute to the progress of public health, not only in Poland, but in the whole world.

Professor Ricardo JORGE, referring to the passage in Professor Léon Bernard's note regarding the discussions which had taken place on the relations between public health experts and the medical profession, wished to reiterate the opinion he had expressed with regard to the position taken up by Dr. Stampar. He was convinced that the entirely new attitude adopted by Dr. Stampar was a serious matter, not only for the future of the medical professsion, but for public health itself, and he hoped that this example would not be followed anywhere.

In reply to a question from Senator POTTEVIN, Dr. CHODZKO explained that the Institute had a special department for labour hygiene. He thanked his colleagues on the Public Health Training Commission, and particularly Professor Léon Bernard and Professor Ricardo Jorge, for the interest they had shown in the new school and for the journey they had undertaken which had enabled the founders of the Institute to profit from their experience. He also took the opportunity to thank Dr. Andrew Balfour, who had given extremely valuable information and had promised his full co-operation in the difficult initial stages of the new institution. He was also most grateful to his Japanese colleagues for having come specially from Tokio to be present at the inauguration ceremony.

Professor Léon BERNARD wished to say that the representatives of the Public Health Training Commission who had gone to Warsaw had had a very profitable visit. The discussions of the Commission on that occasion had been particularly interesting because, instead of taking place round a table, they had taken place at the School which had just been created. It would be well to remember this precedent in the future work of the Public Health Training Commission.

214. Public Health Problems in the Far East : Quarantine in Chinese Ports : Statement by Dr. Tsurumi.

Dr. TSURUMI, with reference to quarantine in Chinese ports, considered that, in principle, and from a purely technical point of view, an improvement in the health conditions of the Chinese ports was extremely desirable, not only for the country in which these ports were situated but also for all the neighbouring countries which, directly or indirectly, were in contact with them. It was for this reason that the question was worthy of serious consideration if the Committee were called upon to study the technical problems which it involved. He agreed with the opinion expressed by his colleagues at the previous meeting that the best procedure would be for the Committee to study the question in detail when called upon to deal with it.

215. Public Health Problems in the Far East and Work of the First Session of the Advisory Council of the Singapore Bureau (continuation).

Dr. TSURUMI read the following declaration.

"As regards the Singapore Bureau, the work which it had carried out during the period of a year or so after its foundation has more and more clearly demonstrated the fact that it is meeting a genuine need, and that it had effectively served the purpose for which it was intended.

"As regards the budget of the Bureau for 1927, I can only ask that the expenditure proposed by the Medical Director may be approved.

"As regards the question of financing the Bureau in future, I venture to think that the League of Nations should pay a share of the expenditure, for the reasons which the Japanese delegate considered it necessary to put forward during the last conference at Singapore.

"Considering that the advantages accruing from the establishment of this office are enjoyed not only by the Far Eastern countries, but by other countries as well, and considering further that difficulties arise whenever an attempt is made to fix the amount of a reasonable contribution from each Government, the Japanese Government is of opinion that the League of Nations should take these facts into account and make provision in the general budget of the League for the expenditure required for the work of the Bureau.

"I am well aware that the budget of the Health Organisation has been fixed for some years to come, after lengthy discussions at the last Assembly at Geneva.

"I should like to ask you, however, to bring this matter up for discussion again, and to examine the principle involved, in order that its equity may be recognised and that a favourable solution may be reached within the shortest possible time.

"A similar opinion regarding the budget was advanced, at the last Conference in Singapore, by the Japanese representative and also by the delegates of certain other countries. For these reasons I would ask you to investigate this matter thoroughly, and to give favourable consideration to the views of the Far Eastern countries.

"With reference to the appointment of a Deputy-Director of the Singapore Bureau, my Government is anxious that this post should be given to a Japanese medical officer, not only because Japan is keenly interested in the Bureau, but also because it firmly intends to assist more actively in promoting the efficiency of its work by giving it the support of Japanese medical science and of its health administration.

"In other words, the health conditions in the Far East are such, as I have repeatedly pointed out, that my country is not merely under the constant menace of infectious diseases, more particularly cholera and plague, but is in fact visited by a cholera epidemic nearly every year.

"In the circumstances, the work of the Japanese health administration does not afford an adequate safeguard for health conditions in Japan, and action on international lines is essential if my country is not to fall a prey to the above-mentioned infectious diseases. Until such time as this highly desirable reform is brought about, the Japanese Government has appointed three medical officers, one in Shanghai, one in Hong-Kong, and one in Manila to keep a permanent watch over the health conditions in these ports. They are further required to make an immediate and detailed report to the Japanese Government on all cases of infectious diseases which may occur.

"In addition to this, thanks to the efforts of the League of Nations, the Singapore Bureau has been duly established and has already effectively carried out the work entrusted to it.

"For these reasons my Government is desirous that close relations between that Organisation and Japan should be established immediately, not merely from an anxious desire to safeguard the health conditions of the country, but also with the object of promoting the efficiency and future development of the Bureau.

"I therefore venture to ask whether you are prepared to consider my proposals and to recommend that they should be carried out.

"As regards the enquiries into the health problems of the Far East, they are particularly important, in view of the fact that health conditions there are less favourable than in Europe. That being so, the resolution adopted in that connection by the Advisory Council of the Singapore Bureau is wholly fair and reasonable.

"I would therefore beg you, gentlemen, to give your fullest support to the proposal to set up committees of experts to co-ordinate the enquiries on the diseases mentioned in the Medical Director's report."

Sir George BUCHANAN said he had already distributed a note on the Singapore reports. If the Committee wished to discuss the first two points in it, he would ask for this part of the note to be read; if not, that it should be annexed to the Minutes (Annex 82). In the latter case he would deal exclusively with the third part of the note concerning "the utilisation of the Bureau for fresh research work in the East".

Dr. RAJCHMAN thought that Sir George Buchanan's suggestions would be of great value to the Singapore Bureau and to the Advisory Council, which was to meet in January next. Referring to the Advisory Council, he explained that, at Singapore, he had asked the various members of that body to obtain the observations of their Governments and to forward them to the Bureau, in order that this information might be submitted to the Health Committee in October. It must be remembered that the present Committee's mandate and, consequently, that of all the technical commissions which it had set up, would expire at the end of the year. On the other hand, Sir George Buchanan had proposed that the President and the five Vice-Presidents of the Advisory Council should not form a Bureau and should not meet between sessions. He was in agreement with this proposal and believed that it would be accepted by the Advisory Council.

Dealing with the third part of his note, Sir George BUCHANAN said that any discussion on the subject might seem premature, in view of the fact that the Governments had been asked to give their views, and having regard, moreover, to a telegram just received from Colonel Graham, which had been distributed to the members and which he would read:

> "Much regret that previous engagements in London prevent my coming to Geneva this week. Please communicate following to all members of Health Committee at Geneva regarding resolutions seven and eight of Singapore Advisory Council. These resolutions represented only personal opinions of representative of India and, as far as he understood, of other delegates present. Government of India have not yet expressed opinion on their merits. Before Health Committee proceeds further in the matter it would be well to obtain views of each Government represented at Singapore upon them; both resolutions present difficulties and require careful consideration in India before they are considered at Assembly in September in order that Indian delegation may be fully instructed. It was understood by me that this procedure would be followed as proposals represent only one way of ensuring maintenance of present Bureau and extension of its functions."

Sir George Buchanan thought, however, that his observations might help in the examination promised.

Part 3 of Sir George Buchanan's note was then read.

Proceeding, Sir George BUCHANAN explained that he had prepared this note after receiving the documents which had reached him in London, and before he had had the advantage of hearing the Medical Director's verbal observations which had cleared up certain points. The intention, it would seem, had been to set up the enormous machinery proposed in order to secure the support of the delegates of the Far Eastern States in obtaining fresh credits from the Assembly. It was to be argued that the Singapore Council must have this machinery and that the Bureau could not supply the needs of the Far East unless such credits were granted. He did not think that this was a sound line to take. The Committee should proceed by degrees, select one or more subjects for investigation for the benefit of countries in the Far East and subsidise work on them within the limits of its present stabilised budget.

The Committee had already decided to use part of the present budget for interchanges in the Far East. Could it not do the same for investigations? For instance, if Professor Shiga was to undertake an enquiry on the administration of vaccines by the mouth, the Committee might begin, once the necessary information had been obtained, by placing at his disposal, if necessary, some fraction of the money available in the present budget. Why should it be compelled to set up all these costly Committees, peripatetic "co-ordinators" and increased Secretariat staff at Singapore? The immense distances and the difficulty of absence from duty ought to be considered. He commended the principle of requesting institutes or administrations, singly, to undertake enquiries of this kind and to do their own "co-ordinating" with other workers. To make a quiet and practical start within the limits of the budget seemed the best course.

The generous offer of the Japanese Government regarding the appointment of the Assistant Director raised a question which was properly a matter for the Secretariat. The Committee had no responsibility for the appointment of the staff of the Health Section. If it were to be consulted, however, the question would not be one of nationality but of competence.

As regards the question of increasing the annual budget for the needs of Singapore, he pointed out that, if the Singapore Bureau had, in less than two years, got to its present size and still wanted more money for new duties, the Assembly would be very reluctant to authorise the opening of any other branch Bureau anywhere else.

Dr. RAJCHMAN felt that certain explanations were necessary in order to remove any misunderstanding. So far as principles were concerned, he was in agreement with Sir George Buchanan, and only joined issue with him on the methods to be employed in applying those principles. They had been defined by the Advisory Council in its resolutions, which contained certain proposals. Sir George Buchanan agreed to the new research work and proposed that it should be undertaken forthwith, a certain sum being provided immediately from the funds allocated to the Health Committee.

If he had rightly understood the declaration made at Singapore on behalf of the Japanese Government, the idea was as follows : The League of Nations, recognising the necessity of technical work in the Far East, had set up the Singapore Bureau. Four-fifths of the expenditure of this Bureau were covered by the Rockefeller Foundation ; sooner or later these contributions would cease and, in any case, they were already inadequate. The League of Nations should therefore contribute towards the funds of the Singapore Bureau, as it stood, but should not undertake new commitments. It would be seen whether this opinion, which had been expressed on behalf of the Far Eastern States, would be supported by their delegates in the Assembly. Speaking on his own behalf, Colonel Graham had put forward similar ideas. He, the Medical Director, had explained to the Advisory Council the difficulties with which the Health Committee was now faced, and had pointed out that the Governments concerned must accept responsibility before the Assembly. In a word, the aim was not to secure supplementary credits for specific investigations but to cover the ordinary expenditure of the Bureau.

As regards the machinery referred to by Sir George Buchanan, there was no need for apprehension. In the first place, it was highly probable that Sir George Buchanan's suggestion to the effect that the Bureau of the Advisory Council should not meet between sessions would be accepted by Colonel Graham. Furthermore, in view of the difficulty of bringing the whole of the Advisory Council together at one time, the Bureau had only to examine the replies received and then send a memorandum to all the members of the Advisory Council. In any case, these meetings would not take place.

Again, there was no intention of setting up a large committee of experts, but merely of introducing in the Far-East the methods which the Health Committee had applied up to the present, with such signal success, to the research work on the standardisation of serological and biological products. To take an instance, since research work on the administration of vaccine through the mouth would have to be undertaken simultaneously in five different centres, the simplest way of proceeding would presumably be to set up a Committee consisting of the Directors of the Institutes concerned, assisted by one or two experts of world-wide reputation ; the members of this small committee would agree among themselves as to the plan of research work and would subsequently compare results.

A co-ordinating officer was necessary since the specialists concerned would be separated by enormous distances, and it was more practical and economical to have a single person travelling than to bring all the others together.

Sir George Buchanan had suggested that one health administration or institute should be selected, but the Health Committee was presumably not proposing to entrust the work to a single institute ; it was only natural that the various institutes which had already begun their investigations should wish to compare the results which they had obtained. Furthermore, to set up four or five centres for each investigation, instead of using the Singapore Bureau as a single co-ordinating centre, would be tantamount to introducing a new method in the Health Committee's procedure without effecting economies — quite the contrary — and without obtaining the desired results — that was to say, facilitating the execution of the work already undertaken and the comparison of results.

Neither was there any question of increasing the Singapore personnel. The Director of the Bureau had already been appointed. All that now remained to be done was to appoint the Assistant Director, and the most capable expert should be chosen, irrespective of political considerations. The Medical Director was glad to say that his Japanese colleagues had submitted a candidate who fulfilled all the requisite conditions. All that was necessary, therefore, for the moment was to fill the post of Assistant Director.

Referring to Colonel Graham's telegram, the Medical Director, while recognising the necessity for proceeding cautiously, stated that, if the Committee began to interest itself in research work undertaken by national administrations and institutes, it would no doubt exercise its influence through the intermediary of the Singapore Bureau.

As regards Professor Shiga's researches, the Medical Director pointed out that the well-known Japanese savant would not need credits from the League of Nations, since the sums already at his disposal were much greater than any which the League could grant him. What Professor Shiga, as well as the others engaged in this research, asked was that they should be brought into touch with others who were engaged in research work of the same kind. Could not the same method be adopted as that which had already proved so successful when applied to research work on standardisation ?

The Committee would, he was sure, do its utmost to meet the wishes of Colonel Graham, who had pointed out the difficulties involved by the two resolutions relating to research work and the budget. The Committee certainly desired to obtain the full support of the Indian delegation to the Assembly, but Colonel Graham seemed to have misunderstood the procedure adopted by the Committee. When, for example, the Malaria Commission met and submitted proposals, it sent them direct to the Health Committee without first obtaining the views of the different Governments. Any other course might place the Committee in a difficult position.

Dr. Granville observed that, in the French translation of Colonel Graham's telegram, the words "il conviendrait d'obtenir l'opinion de chacun des Gouvernements" did not perhaps accurately reproduce the English text, which read : "it would be well, etc". Colonel Graham had probably merely made a suggestion and not a formal request.

The President thought that the questions raised by Sir George Buchanan and the Medical Director's explanation had made the situation clearer. In order to save time, he proposed to refer the discussion to the Far East Commission.

Sir George Buchanan was glad that the discussion he had opened had enabled the Medical Director to elucidate certain points and the Committee to obtain a clearer view of the present situation. He seconded the President's motion.

Dr. Jitta also supported the proposal.

The President's proposal was adopted.

The President asked that Dr. Granville should be appointed a member of the Far East Commission.

This was agreed.

Professor Cantacuzène thought it would be desirable to take the present opportunity of endeavouring to solve the problem of the administration of vaccines by the mouth. In most of the experiments hitherto tried in Europe the number of cases treated had been insufficient. Moreover, care must be taken that the experiments were always made with "controls". If it were decided to undertake this enquiry in the Far East, it would be desirable for the research to be carried out in various centres, but a committee of experts should meet to decide upon a general method of work and ensure a certain measure of uniformity.

216. Trachoma : Report by Dr. Lutrario.

Dr. Lutrario read his provisional report and observed that it only contained a general survey of the question, as it had not yet been possible to collect all the necessary information. He desired to thank Dr. Jitta for his co-operation, and also the Secretariat for its valuable assistance.

The President thanked Dr. Lutrario for his report, which already contained a number of proposals regarding prophylaxis and the treatment of trachoma.

Dr. Jitta desired to say that he had merely offered a few suggestions to his colleague, Dr. Lutrario, who had been good enough to take them into consideration in his report. Trachoma was a chronic disease; he himself had never seen any acute cases in the Netherlands. It was a social malady, which would be combated chiefly by improving housing conditions. So long as these conditions were not improved, the laws on the subject would remain inoperative. Moreover, there appeared to be no need to adopt the system of compulsory notification, which would scarcely reveal a tenth of the total number of cases.

A distinction should be drawn between cases which required hospital treatment and cases for which it would be sufficient to set up a number of conveniently situated dispensaries.

In Egypt the incidence of the disease had been slightly reduced by the introduction of mobile hospitals.

The inspection of schools was a very important matter. Attempts could be made to cure adults suffering from the disease, but its spread among children must at all costs be prevented ; such a campaign was relatively easy and constituted the best means of destroying the centres of infection.

Finally, it was also necessary to instruct the doctors themselves, not only to prevent the spread of trachoma, but also in order to enable diagnostics to be established, a matter which was often very difficult.

Professor Nocht pointed out to Dr. Lutrario that, according to his report, there appeared to be a large number of centres of trachoma in Germany. Some twenty years previously, a large centre had existed in East Prussia, but it had now practically disappeared; even before the war the number of cases there had been reduced by more than 90 per cent. Throughout the rest of Germany only isolated cases were found. He pointed out that compulsory notification had played a very large part in the drastic campaign that had been instituted against trachoma.

Dr. Chodzko stated that in Poland there were eight hospitals for the treatment of trachoma, with about fifteen hundred beds. He could not agree with the conclusion reached in the report that children suffering from trachoma could attend school without endangering their school-fellows. The contrary had been found to be the case in Poland.

Professor Cantacuzène referred to the experimental treatment of trachoma by chaulmoogra oil, which had been adopted that year in Roumania (where trachoma was very common) as a result of the highly successful experiments made in Morocco.

Dr. Carrière wished to inform the Committee of the fact that while trachoma had been almost unknown in Switzerland a few years previously, the number of notified cases now tended to increase. There had been 13 in 1924 and 16 in 1925. They were only sporadic cases and their origin had remained very obscure. Some of those attacked by the disease, for example, had never left Switzerland and did not appear to have come in contact with persons suffering from trachoma. It might even be asked whether there had not been on occasion an error in the diagnosis.

However that might be, the increase in the frequency of trachoma had attracted the attention of the health authorities, who had thought it necessary to deal with the matter. Thus, since 1923, the notification of trachoma had become compulsory throughout Switzerland, and instructions for the use of doctors were being prepared.

With regard to compulsory notification, Dr. Carrière willingly agreed that its usefulness could be questioned in the case of countries and districts where trachoma in its endemic form was widespread. He thought, however, that it was indispensable for countries where the

disease was only sporadic. Such notification was not required merely for statistical purposes. It should have the effect of attracting the attention of the proper authority, thus making it possible to take the necessary measures to prevent the formation of centres of infection. With regard to this point, Dr. Carrière could not agree with the negative views of the Rapporteurs concerning compulsory notification, and he would be glad if the conclusions of the report could be modified in this sense.

Dr. Tsurumi fully approved Dr. Lutrario's report. Trachoma was still common in Japan, despite all the preventive measures that had been taken. He hoped to communicate information on this subject in the near future.

Surgeon-General Cumming asked his colleagues to inform him as to the work which had been done in regard to the etiology of the disease. The research work undertaken in America had not as yet proved very successful.

Professor Chagas stated that trachoma had recently been introduced into South America, chiefly by European emigrants. There was a large centre of the disease among the Italians in the State of Sao Paulo in Brazil. A systematic campaign had been organised, chiefly by means of dispensaries. He thought that compulsory notification was necessary when trachoma was not very widespread.

Dr. Granville understood Dr. Jitta to say that trachoma was not very dangerous from the point of view of infection ; the reverse had been found to be the case in Egypt.

Professor Pittaluga urged the necessity of compulsory notification even in countries where trachoma was endemic. He thought the report might contain a conclusion to that effect.

Dr. Lutrario thanked his colleagues for their reception of his report and for their observations. He would take note of the information given by Professor Nocht and Dr. Chodzko. He thought compulsory notification useful where large numbers were concerned, but somewhat dangerous in those parts where cases were sporadic, as the families of infected persons would be afraid of the inconveniences they might be caused and would conceal any cases that might arise in their own circle. That, at any rate, was his personal opinion, but each country should take whatever measures it thought advisable. In Italy, there was a large number of schools for children suffering from trachoma. The spread of the disease could be checked if certain elementary rules of health were observed.

In reply to an observation by Dr. Chodzko Dr. Lutrario explained that only children without eye discharge could attend schools without danger. In reply to the question raised by Surgeon-General Cumming, he stated that in Italy also research work on the etiology of trachoma was being carried on.

Dr. Jitta thought that compulsory notification was necessary when measures of isolation could be taken, as, for example, in the case of plague or cholera, but he did not see how such measures could be applied to trachoma. What Dr. Lutrario and himself had in view was rather a systematic treatment, such as was already established in certain countries, and which aimed not only at curing adults but also, and above all, at preventing the outbreak of the disease among children. The real danger lay in the discharge from the conjunctiva.

There was no danger in trachomatous children attending school, provided that the necessary precautions were taken and that children suffering from discharge were not allowed to attend. The infection did not spread in the schools but at home.

Professor Pittaluga pointed out that compulsory notification had two objects :

1. To facilitate the compilation of demographic statistics ;

2. To create for the State which imposed compulsory notification the obligation to take proper measures.

The President observed that the report before the Committee was only a provisional one and that its conclusions could only be adopted at a later session.

Dr. Lutrario, referring to the investigations which the Health Section was to carry out, thought it would be desirable to draw up a small questionnaire, so as to obtain replies giving comparable data.

Sir George Buchanan thought that it would be a pity to discuss a question of such importance in a summary fashion. It would be better for the Office international to study the question, as it would be able to give it full consideration.

Dr. Rajchman agreed with Sir George Buchanan's suggestion, and begged Dr. Lutrario not to press his proposal. If he would indicate exactly the kind of information he desired, the Secretariat would do its best to obtain it.

Dr. Lutrario agreed with the Medical Director.

Dr. Granville urged that, if the problem were to be referred to the Office international, the Committee would not drop the question altogether.

The President approved Sir George Buchanan's proposal and thought that a decision of this kind might be referred to the Office international d'hygiène publique.

Sir George Buchanan added that the Office international, as an advisory body, formed part of the same organisation as the Health Committee.

FIFTH MEETING

Held on Friday, April 30th, 1926, at 10 a.m.

Present : All the members of the Committee, with the exception of Dr. Alice Hamilton Professor Léon Bernard, Professor Ottolenghi and Dr. Mimbela.

217. Work of the Malaria Commission : Report by Dr. Lutrario.

Dr. Lutrario presented his report (Annex 84) and developed certain passages concerning the experiments undertaken with the help of the secondary alkaloids of cinchona. He drew the attention of the Committee to the advisability of continuing these experiments and of undertaking another series of researches with cupreine, which was found in its natural state in the bark of the *Remijia pedunculata* plant, the cultivation of which had virtually ceased and of which there were at present only a few rare specimens. Cupreine was more efficacious, it seemed, than quinine and had the great advantage of being easily taken. By means of cupreine it was possible to prepare synthetically ethylcupreine or cuproethylene, which appeared to be the ideal drug against malaria. It would also be interesting to experiment with hydroquinine derived synthetically from quinine, which would, he was assured, be more effective than quinine.

These researches would be of the greatest importance from the point of view of the prophylaxis of malaria, since the present difficulty lay in the fact that there was not yet sufficient means of causing the hæmatozoa to disappear completely and permanently from the blood of the patient. In spite of the excellent results obtained by quinine, the macrogametes, which lodged in the deeper organs, managed to survive for a fairly long period, and were able to cause a relapse, at a given moment, with the invasion of the surface blood by a new generation of parasites.

He expressed the desire that the Committee would approve these researches, as well as all the other work undertaken by the Malaria Commission. He hoped to be in a position to submit to the Health Committee during its October session the final draft report on the activity of the Malaria Commission during the three years of its existence.

The PRESIDENT thanked Dr. Lutrario for his statement. He also congratulated Professor Cantacuzène, Professor Nocht and Colonel James upon the important work that had been carried out in their laboratories.

Dr. CHAGAS, referring to the experiences of Colonel James, remarked that the difficulties of the experimental infection of mosquitoes were well known to research workers. It was possible to theorise on this subject, for example, on the minimum number of male gametes at the moment of the experiment, but there were other causes still unknown.

An epidemiological factor of the greatest importance lay in the disproportion between the degree of infection of a center, domestic or regional, and the number of mosquitoes. Research work on this subject was being carried out in Brazil ; this work had not yet yielded any definite results, but it had given rise to certain interesting observations, in particular, upon the presence of oocytes not only in the stomach but also in the muscles of the Anopheles. A report would be made upon the point as soon as it had been found possible to form definite conclusions. In Brazil, as in Italy, anophelic regions had been found without malaria. The exact cause of this phenomenon was not yet known ; it presented a fresh problem of a high epidemiological importance.

In conclusion, Dr. Chagas said that he had also carried ont research work upon the use of quinetum in tropical malaria.

Professor NOCHT made a few remarks on therapeutic subjects. Cupreine was derived solely from *Remijia pedunculata*. It was not possible either to obtain it synthetically or from quinine. Moreover, this product possessed qualities superior to those of quinine in the treatment of malaria. Thirty years ago two French experts had carried out experiments with this product and had obtained quinethylene from it, which possessed remarkable therapeutic properties. Professor Nocht had attempted to utilise this substance, but had been unable to obtain sufficient quantities of it because the tree from which it was derived was no longer cultivated ; a few samples were to be found only in Bolivia and Peru. It would be interesting to resume these experiments, and in this connection the Health Committee might request the Bolivian and Peruvian Governments to make a search for any trees still in existence, in order that their cultivation might be resumed.

Sir George BUCHANAN considered that the work of the Malaria Commission was one of the most interesting and useful that the Health Committee had undertaken. He was glad to note the value attached by the Commission and the Committee to the preliminary report by Colonel James on induced malaria. The British Ministry of Health, in its desire to assist the Malaria Commission of the League, had in this matter been self-denying. The work reported upon by Colonel James was purely British official medical work, undertaken without any international subsidy, and the full results of it naturally would ultimately be published in official reports of the Ministry. That department, however, had given the League the

priority of publication of the first results, in view of their wide application to many malaria problems.

The quinine question formed a sufficiently special subject for separate study. Would it not be possible, in order to keep up to date on the question, to prepare a monograph on the subject without waiting for the final report ?

In conclusion, he suggested that, to avoid the appearance of creating "super-hygiene" at Geneva, Dr. Lutrario might modify the following words in the last paragraph of his resolution : "drawing their attention to the advantages that would accrue", etc., as follows : "draw their attention to these considerations and indicate that so far as the information received by the Committee enables it to draw a conclusion, it would be desirable to take into consideration the following principles in the application of the treatment of artificially produced malaria".

Professor PITTALUGA, referring to cases of anophelism without malaria, stated that this phenomenon had been observed also in certain districts in Spain where research on the subject was being carried on.

He asked the Committee to consider two important questions which arose from the report of Dr. Lutrario :

1. As regards quinine and, in general, the principal therapeutic agents for malaria, did the Committee consider it opportune that, this year, the Malaria Commission should present, in its final report, conclusions concerning the treatment and prophylaxis of malaria, or did it consider that this question should be postponed for a later report to be drawn up after closer study ?

2. What should be the form of the final report of the Malaria Commission ? Would it be simply a summary of objective observations, of the results of voyages made, or a real guide containing a group of rules for malariologists in the form in which they emerge from the findings of the Malaria Commission and consequently of the Health Committee ? Between these two extreme conceptions of the final report there were a number of possibilities upon which it was desirable that the Committee should express an opinion.

In reply to a question by Senator Pottevin, Colonel JAMES explained that, as a rule, a case of malaria was infectious ten days after development of the first symptoms, and not ten days after the puncture ; an incubation period of twelve days was possible.

Professor CHAGAS added that this period represented the minimum limit for a case to be infectious.

Senator POTTEVIN stated that research work to be carried out in the delta of the River Po would perhaps make it possible to elucidate the important problem of the differences in saltness of surface water.

Professor NOCHT, returning to the question of inoculation, stated that in Germany up to the present this process had been applied to a thousand paralytic cases and that very few accidents had been observed. The method of direct infection by mosquitoes had not been adopted in Germany : moreover, it was extremely costly. Further, in England, where this method was in general use, there were also hospitals where, when an absolutely pure culture had been obtained, the transmission of the infection was continued by the injection of blood. It would therefore be going too far to say that the direct injection method should be limited to exceptional cases.

Dr. LUTRARIO thanked his colleagues for their kind reception of his statement and of the work of the members of the Malaria Commission. He wished to reply to the remarks of some of his colleagues.

To Professor Chagas : Anophelism without malaria was frequently observed in Italy. Considerable research had been devoted to the subject without unanimity of opinion having yet been attained amongst experts regarding the causes of this phenomenon.

To Sir George Buchanan : He entirely approved the amendment proposed, which was one of form and not of substance.

To Professor Pittaluga : Had not the moment perhaps arrived to express an opinion on the question of a special report on quinine and other alkaloids ? In September, the Commission would consider whether it was desirable to include in the report conclusions upon this subject ; if in the negative, no such conclusions would be presented. With reference to the type of report to be adopted, it was necessary to avoid any idea of a treatise on malariology ; in view of the interest aroused by the conclusions of the report of 1924, it would seem essential only to draw up well-proven conclusions, and to respond to the expectations of the various health administrations.

To Senator Pottevin : the opinion of malariologists in Italy was very divided on the question of the saltness of the breeding places of Anopheles ; this question should be studied by the Commission ; it might prove to be an effective and economical method of combating malaria.

To Professor Nocht : the Malaria Commission had contented itself with suggesting that, as far as possible, recourse should be had for the first cases to direct inoculation by mosquitoes ; in Italy the doctors alone decided the method to be employed.

The PRESIDENT added that everything possible would be done to satisfy Professor Nocht's request in the matter of obtaining cupreine.

The report of the Malaria Commission was adopted.

218. Appointment of a correspondent Member of the Malaria Commission.

The PRESIDENT proposed, on the advice of the Chairman of the Malaria Commission, to attach to this Commission as a correspondent member Professor Schilling of Berlin.

This proposal was adopted.

Professor PITTALUGA expressed to the Committee the thanks of Dr. de Buen, who had been nominated a correspondent member on the Malaria Commission.

219. Leprosy : Report by Professor Chagas.

Professor CHAGAS presented the following statement :

"In the report which I have had the honour to put before the Committee (Annex 85), I wished above all to emphasise the international importance of leprosy. I would like to obtain the technical assistance of the Committee on this subject.

"I have not considered in this preliminary communication all the scientific aspects of the problem, but, basing my arguments on accurate statistics, I have attempted to justify my conviction that the serious medico-social problem which we are about to discuss cannot under any pretext be excluded from our work. I will attempt later, after hearing the opinion and possibilities of action of the Committee, to present a more detailed study of the question with the object of facilitating the greatest possible diffusion by the Committee of essential knowledge concerning leprosy.

"I wish meanwhile to draw the attention of the Committee to the most important facts which emerge from the statistics that I have studied and to the epidemiological factors mentioned in my report. First of all, the high proportion of leprosy in certain countries, notably in the colonies of the great nations of Europe, is at once noticeable. A most serious point is that the disease is tending to spread both in the large centers alreading existing and from those towards districts hitherto immune. Thus, the countries which are at present free from the horrible disease are in imminent danger of being attacked by it. This danger of the international spread of leprosy should all the more be emphasised, because no international regime exists, there is no legal provision which allows of, or directs measures for, preventing the importation of leprosy.

"Speaking of South America, I am able to state that the number of lepers is very high. In my own country the official statistics show, up to the present, about 11,000 cases; no doubt a complete census would show that this figure was too low. As regards the other South American countries, I am in a position to inform the Committee that in some of them the proportion of leprosy is still higher than in Brazil. It is true that certain nations are energetically attempting to combat leprosy and are even able to act wisely in this field. But it must be realised that other countries do not attach sufficient importance to this question and that among some nations there is a lack of technical direction such as would ensure success. Further, we must bear in mind that the problem of leprosy presents certain obscure features which must be cleared up if the disease is to be prevented. So much for the question of treatment to which every effort should be devoted in order to bring health to thousands and thousands of unfortunate people.

"In my opinion the exact method of infection is the essential point of the problem ; the whole campaign against this terrible disease should be based either upon such treatment as may be found most efficacious, or upon a knowledge of the exact methods of infection and of the dissemination of the disease. I do not wish to touch upon other points that might be raised in connection with this important question. My only object is to state in my report our responsibilities before the world in connection with this clearly international problem.

"Could the Committee interest itself at once in the programme which I beg to propose ? I am of opinion that we could with advantage follow the procedure adopted in the case of the resolution concerning child-welfare, that is to say, invite specialists from certain countries to supply the Committee with studies and suggestions regarding this serious medico-social problem."

The PRESIDENT thanked Professor Chagas for his statement and opened the discussion on the suggestion concerning the appointment of specialists from certain countries.

Dr. RAYNAUD supported this proposal. As representative of his Government at the Conferences held at Berlin, Bergen and Strasburg, he had taken note of the ineffectiveness of the recommendations of these Conferences which were usually forgotten. Moreover, the measures that it might have been possible to take remained for the most part a dead letter. The question could therefore with advantage be methodically studied by the Committee. This problem raised many points that it was important to elucidate — for example, the absence of contamination in certain centers where lepers were to be found. A Commission appointed by the Health Committee could assist in solving these various problems.

Dr. JITTA thanked Professor Chagas for having taken the initiative in the study of leprosy. Leprosy was practically non-existent in the Netherlands, but was common in the Dutch East Indies, and still more so in the West Indies. He supported the proposal of his Brazilian colleague, of whom he wished to ask two questions :

1. Experience had shown that, in the Netherlands as a rule, leprosy, of which there were perhaps 100 cases, did not spread. Exceptions were very rare. Was it correct, as had been stated, that leprosy was not infectious in Central Europe ?

2. A very important question concerning the Dutch Indies : Should leprosy cases be isolated as far as possible, or, as was done in certain other countries, should lepers be allowed freedom upon condition that, if they got worse, it should be possible to isolate them ? It was certain that lazar-houses were very costly, and prevented the treatment of the malady.

Dr. TSURUMI congratulated Professor Chagas on his report. As the Rapporteur had mentioned, cases of leprosy had for a long time been fairly frequent in Japan. A law on preventive measures against leprosy had been passed in 1907, and was now in force. Scientific research upon this disease had given abundant information, in particular, Professor Shiga had studied for some years the treatment of the malady. As the Committee had been informed by the Medical Director, Professor Shiga had undertaken to supply general information concerning leprosy in Japan. As Dr. Tsurumi was also interested in the problem, he would like to present some information concerning it.

Professor Ricardo JORGE supported the proposal made by Professor Chagas. Leprosy was a universal problem of particular interest to certain countries such as Portugal. It had been observed that in Portugal the smaller leprosy centers tended to shift. Moreover, though the disease was as virulent now as in the Middle Ages, it had lost its power to spread. Cases of infection were very difficult to find. Professor Chagas was in every way in a position to direct the necessary detailed study of the question from the point of view of epidemiological and laboratory research work.

Sir George BUCHANAN laid emphasis on the fact that the magnitude of the task which a study of so widespread a disease would entail should not be forgotten. It raised numerous administrative as well as medical and epidemiological problems. It would be well to profit from the experience acquired by the Committee in the case of other diseases, and limit the questions to be studied. Since administrative measures would be the ultimate result, if it were decided to appoint a Commission to study the question, it would be of value, before going into the problem, to obtain any suggestions which might be made in the matter by the Committee of the Office international d'hygiène publique. This would give the Health Committee the benefit of important data already collected by that Office, notably on the measures adopted in the French colonies, in British territory and in India, as well as valuable information concerning official research work which appeared necessary.

Referring to Professor Chagas's sixth proposal, Sir George Buchanan stated that in England they were opposed on humanitarian grounds to any compulsory notification of leprosy.

There were usually some 70 to 80 cases in England at any given time and they had not proved a source of infection. The question of compulsory notification should therefore in no way be prejudged. Perhaps Professor Chagas could bring the matter before the Office international during the following week, in order to obtain suggestions regarding the scope of the enquiry to be undertaken.

The PRESIDENT pointed out that there was no question at the moment of appointing a technical commission to investigate leprosy, but merely to obtain information from experts. It was clear that an endeavour should be made to obtain all possible information which could be furnished through the intermediary of the Office international d'hygiène publique.

Sir George BUCHANAN thought that, even if this procedure were followed, it would be of use to collect the information which the Office international possessed, thanks to the countries which were represented upon it. When that information was available, the Health Committee would be in a position to determine the points on which it would desire to have detailed investigations carried out.

Surgeon-General CUMMING emphasised the urgency of an investigation into leprosy, either by the Health Committee or the Office international. Isolation measures had been adopted in the United States and at Porto Rico.

Cases continually occurred among persons entering those territories, and it was necessary to send them back, thus causing grave discomfort to the persons affected by the disease. Surgeon-General Cumming read the following passage from a letter which he had received from the American Mission to Lepers :

> "We are still much interested in the possibilities of a united action by the Health Organisation of the League of Nations on the subject of leprosy, especially leprosy in Europe, and the relation of Europe to other leprosy-infected countries. May I therefore express the hope that your personal interest in the latter may bear fruit in some definite action through the League of Nations looking to the relief of those who are now lepers and prevention for the future.
>
> "It will be of interest to you to know that the American Mission to Lepers has just purchased a whole old monastery in Southern France, La Chartreuse de Valbonne, as a home for French and Swiss lepers."

The Mission had considerable funds at its disposal and was actively engaged in the matter.

The treatment of leprosy by means of ethylic acid of chaulmoogra oil did not give in the United States all the hoped-for results and the oil was now used for the most part in its raw state.

Further, it had been noted that anti-smallpox vaccination produced fairly marked reactions in cases of leprosy, as a result of which a clinical improvement was to be observed. Improvement had also been obtained in first cases by means of an ultra-violet ray nasal treatment.

Dr. RAJCHMAN thought that the suggestion of Sir George Buchanan that the Office international should be consulted was excellent. He was under the impression that Professor Chagas considered that the following procedure should be followed: Professor Chagas would get into touch with experts in order to discover what points should be made the object of enquiries and which, according to rule, would be submitted to the Health Committee. To achieve this, Professor Chagas would consult his colleagues at the Office international, while at the same time keeping in touch with experts and centralising the information obtained. He would then, in consultation with experts, submit a programme to the Health Committee which would take the final decision.

The PRESIDENT added that this procedure would be all the easier to follow in view of the fact that the question was on the agenda of the Office international d'hygiène publique.

Senator POTTEVIN explained that France, like England, had abandoned the idea of compulsory notification of leprosy. Personally, he had contributed to the rejection of a bill for the compulsory isolation of lepers. It was by adopting too strict measures of this kind that the greatest harm was done to health measures.

Professor CHAGAS thanked the Committee for the attention which it had given to his preliminary report.

In reply to Dr. Jitta, he explained that the spread of leprosy was very small in Central Europe — perhaps due to an immunity dating from the Middle Ages. It was greater in new countries where, moreover, cases of leprosy were far more numerous. Nevertheless, the disease was a communicable one in Central Europe and a few cases of infection had been met with practically everywhere in European countries. He had emphasised in his report that the most interesting question would be to determine the exact manner in which the disease was transmitted. If that point were settled, the problem would be solved.

The question of the isolation of lepers depended upon the conditions of the particular country. Isolation was possible in the United States, where there were only about 1,500 lepers, but how could it be adopted in India, where there were 100,000 ? It should not be forgotten that the treatment of leprosy had already given remarkable results, especially with chaulmoogra oil. What was wanted was for the treatment to be perfected. In Norway, the isolation of lepers had made it possible to wipe out the disease. In Brazil, lepers were too numerous to be isolated, but they remained under the constant supervision of the health authorities.

In reply to Sir George Buchanan, Professor Chagas said that the problem of leprosy taken as a whole could not be considered. It would, for instance, be impossible to draw up statistics in view of the fact that the number of lepers was unknown. The points to be examined were principally the manner in which the disease was communicated, and its treatment. This required the assistance of experts. International co-operation might perhaps make it possible to determine the general measures to be recommended in all districts where leprosy occurred and even to discover new theories. In any case, it was the duty of the Health Committee to aid the spread of useful knowledge in all the large centres of leprosy ; such knowledge was entirely lacking in certain districts of South America.

The Rapporteur did not ask that national legislation should be passed against leprosy, but that measures should be taken to prevent the spread of the disease from country to country, particularly through sea-ports.

Though anti-smallpox vaccination had been known to have an effect upon cases of leprosy, it was purely transitory. A solution could not be looked for in this direction.

Experts chosen from among the most competent persons would collaborate, not in formulating the questions to be examined, for the various problems were known and also which of them could be considered, but in spreading throughout the leprosy centers the necessary knowledge while awaiting the time when the Health Committee might be able to appoint a special Commission and undertake an investigation of the larger problem mentioned in the report.

The PRESIDENT, summing up the discussion, said that the Committee requested Professor Chagas to investigate the question in consultation with experts to be appointed by Professor Chagas in agreement with the Bureau.

220. Work of the Cancer Commission.

Sir George BUCHANAN drew the attention of his colleagues to the fact that, although no regular meeting of the Cancer Commission or of the Sub-Committee of statisticians had taken place during the present session of the Health Committee, considerable preliminary work had been accomplished. Professors Niceforo and Pittard had prepared a very complete report on cancer statistics as viewed from the geographical distribution of the various anthropological types. These data had just been studied and revised with the aid of Dr. Major Greenwood. The Secretariat had carried out a detailed enquiry into the statistics of deaths from cancer, from unknown or badly diagnosed causes and from old age, in the various countries of Europe. These detailed reports, together with a report on the whole question, would be submitted to the Cancer Commission at its next session in Paris, which would take place from May 26th to 29th.

The members of the Health Committee would doubtless examine with interest the series of maps which had been prepared concerning the geographical distribution of cancer mortality and the various anthropological types in the principal European States.

The investigation of the distribution of the various anthropological types might perhaps be of use not only in connection with cancer, but also with other infectious diseases. Finally, mention should be made of the fact that the British Ministry of Health had issued a second report on the results of surgical treatment of cancer of the breast, by Dr. Lane Claypon, which included an account of the investigations carried out in England as a result of the international recommendations. This report, he suggested, should be regarded as an important part of the work of the League's Commission.

221. Report of the Medical Director on the Work accomplished since the Fifth Session of the Committee.

The Medical Director's report was read (Annex 86).

Section I. No observations.

Section II. Notes of the Health Section on the studies entrusted to it at the October session of the Committee.

With regard to paragraph 1 of this section (relation between the Insurance Medical Services and the Public Health Services), Sir George BUCHANAN asked for explanations concerning the Commission referred to in the special note of the Medical Director on this question (Annex 87).

Dr. RAJCHMAN explained that no Commission had been appointed. At its fifth session the Committee had asked the Medical Director to investigate the relations between the Insurance Medical Services and the Public Health Services. The Health Section had written to the Public Health Services of Austria, Czechoslovakia, Germany, Hungary and Poland, asking them whether they would agree to undertake the investigation in question over certain chosen districts. These services had mentioned a town in each country on which reports would be prepared and had chosen to carry out the enquiry the persons, whose names were to be found in document C.H. 481. In order to make it possible for them to begin their work according to a common plan, these investigators had met at Prague in the presence of members of the Health Section and investigations had been begun in most countries. The persons conducting the enquiry would communicate their provisional results to each other and would probably meet in June to compare them. It would only be on the basis of this provisional report that it would be possible for the Medical Director to submit suggestions to the Committee in October.

With regard to paragraph 2 (Collection of information as to how hospital records can be utilised for notifications of morbidity statistics), Sir George BUCHANAN, referring to the note of the Medical Director on this question (Annex 88), said that in England at any rate there were no "statistical experts" capable of establishing morbidity statistics from hospital records. No one could do so. The material did not permit. The question might possibly be a profitable one for hospital registrars to study.

Dr. RAJCHMAN replied that the Health Section would consult the Health Administrations of the countries in question in order that officials specially qualified to conduct this kind of investigation should be chosen.

Sir George BUCHANAN suggested that in the note under discussion the word "statistical" might at least be omitted.

With regard to paragraph 5 (Epidemiological Bureau for the West Coast of Africa), Sir George Buchanan, alluding to the note of the Medical Director (Annex 91), emphasised the interest which several British Colonies took in this question. If a final Conference were to meet at Geneva, the British Colonial Office might wish to be informed in time, in order that it could send a representative to take part in the discussions.

Dr. RAJCHMAN replied that no Conference would be held at Geneva. The final Conference would take place at Freetown at the beginning of June. Some days later Dr. Destouches would communicate to the Section his report and the resolutions of the Conference. In the meantime, the Section had begun officially to consult the Governments concerned and it hoped to have some replies within two months. These various documents would be immediately summarised in a note, which would be forwarded at once to the members of the Committee. It was important for the Committee to express an opinion on this subject before the next Assembly.

Professor PITTALUGA said that the Spanish Government was very much interested in this question, and that instructions, favourable in principle to the scheme, and drawn up in agreement with the Governor-General of Spanish Guinea had been given to the Spanish participant in the interchange.

Section III. Reports to be presented by members of the Committee in accordance with the resolutions of the October session. No observations.

Section IV. Work of the Commissions, submitted to the April session of the Committee. No observations.

The continuation of the discussion was postponed to the next meeting.

SIXTH MEETING

Held on Friday, April 30th, 1926, at 3.30 p.m.

Present : All the members of the Committee, with the exception of Dr. Alice Hamilton Professor Ottolenghi and Dr. Mimbela.

222. Report of the Medical Director on the Work accomplished since the Fifth Session of the Committee (continuation).

Section V. Departmental work of the Health Section.

With regard to the annual report prepared by the Section on the period January 1st to December 31st, 1925, Sir George BUCHANAN reminded the Committee that the resolution of the Assembly, adopted after an animated discussion, had represented a compromise based on a question of dates. The essential point of the agreement reached had been that the record of the year's work should be prepared within the first few weeks of the new year, and should then at once be forwarded to the Governments. The Governments, and particularly those whose Health Services were not represented on the Health Committee, could then examine it and give instructions to their representatives at the Paris Office in time for its May session. The Paris Committee, according to the resolution, was then to discuss the past work of the Health Organisation and at the same time make suggestions as to the programme of work which would be placed before the next Assembly. The fact that the annual report on this occasion had just been submitted to the Health Committee in draft — he had not himself found time to read it — and had not yet been communicated to the members of the Paris Committee or to the Governments, was, therefore, a matter of some consequence.
Sir George Buchanan thought it would have been opportune to take this constitutional occasion to discuss whether the Committee should not now make greater use of its Advisory Council and whether it should not now contribute directly or indirectly to the expenses incurred by the Paris Office as the result of this co-operation. The constitution of the Health Organisation gave ample authority for such a policy. If better co-ordination were to be obtained, the means were in existence already, and there need not be any question of demanding a new constitution. Greater use should be made of the facilities offered by the existing one.
Obviously good reasons had on this occasion prevented the report from reaching those who ought to have received it. The Medical Director had been prevented by his journey to the Far East from dealing with the preparation of the document. Further, the proximity of the International Sanitary Conference would perhaps rob the discussion next week in Paris of the importance it would otherwise have possessed. Nevertheless, the Medical Director would be wise to add to this passage of his report a paragraph stating why it had not been possible to prepare the annual report for the proper date.

Dr. RAJCHMAN proposed to insert the following sentence : "I regret that it has been impossible to submit this report during the first two months of this year". He did not think it necessary to amend the first sentence of the paragraph, which was in conformity with the resolutions of the Health Committee, from which the Medical Director received his instructions.

With regard to the proposed interchange of sanitary engineers (Annex 96. I. 5) arranged for the present summer in England, Sir George BUCHANAN explained that this interchange had been prepared with the greatest care by a special Committee which had been organised by the Engineering Department of the Ministry of Health, and was representative of the most important sanitary engineering associations. He hoped that the results would be very satisfactory. He suggested various verbal amendments to the paragraph, *which were accepted.*

With regard to the recent interchange visit of Municipal Health Officers to London (Annex 96. I. 3), Sir George Buchanan said that his English colleagues had been much struck by the conscientiousness and zeal of the participants in the interchange visit. Here also he would suggest an amendment of the text in order to emphasise the help given by the various municipal and local authorities, who had taken the greatest trouble to assist in these international interchange visits.

This proposal was adopted.

With regard to the collective interchange visit in Great Britain for 1927 (Annex 96, II, 2.). Sir George Buchanan noted that there was a proposal to adopt a new system whereby groups of two health specialists instead of four or five were to be formed. The British organisers would do their best to assist in this experiment, but, of course, if it did not prove better than the former method, it should be possible to return to that method.

Dr. RAJCHMAN replied that the proposal was indeed in the nature of an experiment. If it did not give the same excellent results which the interchange visits had given during the

three previous years, return would be made to the former system. The ideal would be the individual visit. As this was not possible, it had been thought useful to make an experiment in the form of a group of doctors belonging to three nationalities, including the British medical officer.

Proposed Interchange of Visiting Nurses: Letter from the International Council of Nurses.

Dr. RAJCHMAN said that he had received a letter from the International Council of Nurses proposing that in the general programme of interchanges a special interchange visit should be included for visiting nurses, and suggesting a programme comprising either a visit by a small number of visiting nurses to the United States and Canada, or a visit to Great Britain, France and Poland. It would appear to be of interest, in principle, to organise interchanges of persons other than public health officials and doctors as had been the case with the sanitary engineers. The Health Section might investigate the possibilities of such a programme and submit a report in October, without assuming any definite responsibility in the interval. It was necessary to avoid duplicating the work of the various organisations principally concerned with the system of visiting nurses, but it would be premature to reply immediately in the negative.

Sir George BUCHANAN approved the suggestion of the Medical Director. The work of health visitors and home nursing were very important factors in British public health progress, and he felt sure that any information about this work would be willingly supplied, in order that a useful decision could be reached.

Dr. GRANVILLE thought it necessary to investigate the question in detail before taking any decision or even expressing any opinion on the point.

The Medical Director's proposal was adopted.

Proposed International Conference of the Directors of Anti-Rabies Institutes: Note by the Medical Director (Annex 97).

The PRESIDENT said that the Health Organisation had been asked to deal with the question of rabies. Professor Calmette had said that the Pasteur Institute was ready to summon an international conference on rabies to meet in Paris next spring under the authority of the Health Committee. He considered that the Committee should give satisfaction to the desire which had been expressed in various circles and that the kind offer of the Pasteur Institute should be accepted.

This proposal was adopted.

The Report of the Medical Director was adopted.

223. Work of the Commission on Sleeping-Sickness.

Dr. RAJCHMAN gave some explanations concerning the note which he had drawn up on the work of the Commission on Sleeping-Sickness (Annex 93), work which, up to the present, had been carried on under the most satisfactory conditions. He hoped to be able to submit to the Committee in October a summary of the results achieved and the proposals of the Commission for the following year. It appeared certain that the work would not be finished during the present year.

224. Work of the Tuberculosis Commission.

A note by Dr. TSURUMI was read, summarising the discussions of the Tuberculosis Commission.

This note, amended on the suggestion of M. Velghe, was adopted.

Standardisation of Tuberculin: Report by Professor Calmette.

Dr. TSURUMI said that the Commission had received the report of Professor Calmette on the standardisation of tuberculin. The Committee would doubtless wish to express its very warm congratulations to Professor Calmette. Dr. Tsurumi thanked Professor Léon Bernard, who had made a clinical experiment with tuberculin from the point of view of diagnosis. He also thanked the Directors of the various laboratories for their kindness in furnishing samples of tuberculin and for all the information on the methods of its manufacture and of the titration of this biological product.

The report of Professor Calmette contained complete information methodically and theoretically drawn up, which would contribute to the advancement of science in this field.

The report opened many new aspects of the question. Among others, with regard to the subject of the titration of tuberculin, the distinguished professor had proved that subcutaneous inoculation gave results which were far more satisfactory than any others. Such inoculation made it possible to measure on the same subject the activity of several tuberculins compared with a special standard tuberculin. It was also undoubtedly specific and was economical from the point of view of the number of animals required.

Nevertheless, Professor Calmette had pointed out that it would obviously be premature to propose the adoption of international regulations for the measurement of the activity of this product. Experimental research regarding their titration should still be continued. This question, therefore, should be dealt with, together with any others which it might be thought necessary to examine in the various laboratories. After a certain period of investigation, they would be discussed in the Committee, with the object of drawing up, if possible, international regulations concerning them.

The PRESIDENT said that the Health Committee thanked Dr. Calmette for his remarkable report, which established a real method for the titration of tuberculin. As Dr. Calmette had not yet proposed that international regulations with regard to this substance should be drawn up, the Health Committee would probably be of opinion that the investigations should be continued.

The Committee agreed.

The Appointment of an Expert on the Tuberculosis Commission.

The PRESIDENT said that the Tuberculosis Commission proposed to add Dr. HAMEL to the number of experts.

This proposal was adopted.

225. Work of the Hague Conference concerning Smallpox and Vaccine.

Professor Ricardo JORGE referred to the meeting of the Commission on smallpox and vaccine which had been held during the session. The Commission proposed that, owing to the short time now available, the note which he had prepared should be submitted to and discussed at the meeting of the Committee of the Office international d'hygiène publique. He then summarised the work and immediate results of the Hague Conference (Annex 100)

Professor Jorge's proposal was adopted.

Sir George BUCHANAN referred to the fact that the British Minister of Health in February last had appointed a Committee with Sir Humphry Rolleston as Chairman, with the following terms of reference :

"To enquire and report from time to time :

"(i) On matters relating to the preparation, testing and standardisation of vaccine lymph ;

"(ii) On the practical methods which were available in the light of modern knowledge to diminish or remove any risks which might result from vaccination ;

"(iii) On the methods of vaccination which were most appropriate to give protection against risk of smallpox infection in epidemic and non-epidemic periods.

"And to co-ordinate the work of investigation on these questions in this country and abroad, having regard to corresponding work undertaken by international health organisations."

The appointment of this Committee and its terms of reference had been publicly announced, and it was already at work. It would be seen that each of the three main points of its terms of reference were of interest in connection with the international investigation which had been proposed by the Conference at The Hague, and that the Committee had receired instructions to take into account the international work which was being undertaken in these directions.

Among the questions to which the British Committee was giving attention was that of the occurrence of encephalitis after vaccination. The Committee had already felt the necessity of utilising every possible means to ascertain whether the occurrence of such cases could actually be established in England at the present time. At the request of the Committee, therefore, the Ministry of Health recently issued a request to all medical practitioners, which was published in the chief medical journals (April 17th and 26th). By this communication all practising members of the medical profession were invited to inform the Committee as soon as possible of every case in which they had ascertained that vaccination had preceded the onset of symptoms of diseases of the central nervous system within a period of four weeks. By collecting and examining the information thus furnished, the Committee hoped to be able to ascertain whether there were any features which distinguished cases of acute nervous disease which happened to be post-vaccinal from those which were not. By the same method, they should be able to apply, to any cases mentioned, the system of investigation proposed by the Hague Conference.

As regards the position in general, Sir George Buchanan considered that there would be great advantage in a further discussion of this subject at the Office international in Paris, where it had already been the subject of important communications. Among the subjects on which information was particularly desirable, he mentioned a comparison of the actual methods of vaccination, including the extent of the area scarified, which are adopted in different countries.

226. Public Health Problems in the Far East and Work of the First Session of the Advisory Council of the Singapore Bureau (continuation) **: Resolution.**

The following draft resolution was read :

"The Health Committee,

"Having considered the resolutions presented to it by the Advisory Council of the Eastern Bureau and the Minutes of the meeting held in Singapore, January 4th to 6th, 1926 :

"1. Approves the budget estimates for the year 1926 passed by the Advisory Council, amounting to 69,761 Straits dollars (39,763.77 gold dollars) (Resolution III of the Advisory Council);

"2. Desires to express its special thanks and appreciation to the following Administrations, on whose behalf their delegates at the Singapore meeting of the Council made promises of financial assistance to the current expenses of the Bureau as stated below:

The Government of:

The Straits Settlements . .	5,000 Straits dollars (for 1926)
Siam	2,000 Straits dollars (for 1926)
The Philippine Islands	5,000 Straits dollars (for 1927)
Japan.	from 7,000 to 10,000 yen (for 1926)
French Indo-China.	6,000 piasters (for 1926)
Hong-Kong	up to 5,000 Straits dollars (for 1927)
China.	2,000 Straits dollars (for 1926)
Netherlands East Indies. . .	sum not stated for 1926

and recommends the acceptance of these offers;

"3. Wishes to express its thanks and appreciation to the following Administrations, which are contributing to the efficient working of the Bureau by broadcasting in code, free of charge, the Bureau's weekly epidemiological report:

The Government of:

French Indo-China, broadcasting from	Saigon
Netherlands East Indies, broadcasting from . .	Malabar (Java)
British North Borneo, broadcasting from . . .	Sandakan
British India, broadcasting from	Bombay, Madras, Calcutta, Karachi;

"4. Associates itself with Resolution II adopted by the Advisory Council, which contains a just appreciation of the services rendered by Dr. Brooke, the Director, in organising and developing the work of the Bureau;

"5. Takes note with interest of Resolutions I, IV, V, VI, VIII, IX, X and XI adopted by the Advisory Council (Annex 104);

"6. Notes with interest the recommendation contained in Resolution VII concerning the creation of expert committees to co-ordinate research in the Far East in public health questions of great international importance;

"Decides to proceed at once, in consultation with the Administrations concerned, to the constitution of an Expert Committee to deal with the question of the administration by mouth of vaccines against acute intestinal infections, to consist of directors of research institutes in those countries where enquiries of this nature are actually in progress or about to be undertaken, with the addition of experts from Western countries selected for their special competence in this matter;

"Invites the Medical Director to obtain from the members of the Advisory Council of the Eastern Bureau further information regarding the other suggested subjects for co-ordinated research for which the creation of expert committees was recommended."

The resolution was adopted.

227. Administration of Vaccines by the Mouth: Appointment of Experts.

The President proposed that Professor Besredka and Professor Hahn should be associated in the work of Professor Cantacuzène.

This proposal was adopted.

Sir George Buchanan thought that it might be advisable to add some other names, and would like to consult his colleagues on the Medical Research Council on the subject. Would it be practicable for the President to make additions later?

He disliked the terms "oral" and "buccal" vaccination. What was meant was the administration of vaccines by the mouth.

The President said that the proposal he had made was not designed to limit the number of experts to be appointed.

228. Invitations to send Representatives of the Health Organisation to various Conferences.

Dr. Rajchman read a note in regard to the various conferences to which the Health Organisation had been invited to send representatives.

1. *Conference on International Affairs* (*New York, May 10th to 13th*, 1926).

No observations.

2. *Conference on health in the merchant marine* (*Oslo, June 28th - July 5th*, 1926).

Sir George Buchanan asked the President to give the Committee additional information regarding this Conference, which the British as well as other Governments had been asked to attend.

The President explained that the Conference at Oslo had been convened under the auspices of the Norwegian Red Cross and the League of Red Cross Societies. Although the organisation set up under the auspices of the Office internationale d'hygiène publique dealt with sailors suffering from venereal disease, it had been thought good to extend the work of protection to sailors suffering from any disease. The Red Cross organisations of the various countries had been invited to discover or endeavour to establish institutions where sailors could be cared for and treated properly. Anything which could be done to improve the health of sailors was of interest to the Committee in connection with its campaign against the most important infectious diseases. The Conference would also deal with the living conditions of sailors on board ship, their insurance in cases of invalidity and other questions of the same kind. The Committee could not refuse to take note of these investigations, for, although the proposal to convene the Conference had been made by the Red Cross, it was obvious that the Health Administrations would be called upon to deal with the matter. Some of these questions would perhaps have to be submitted some day to the Committee.

Senator Pottevin thought the Conference would have to deal with questions of two different kinds. There were regulations in all countries governing the living conditions of sailors on board ship, but it might be of use for the Red Cross to consider improvements in this field. Further, with regard to treating sailors ashore, confusion regarding the position as far as venereal diseases were concerned and the position with regard to other diseases should be avoided.

In France every sick sailor could, without difficulty, obtain medical treatment in a port, but the costs of hospital treatment were charged to the shipowners. It would be very difficult to find countries where repayment of these costs was not recognised. It was different in the case of venereal diseases. The infected sailor might dislike the idea of the costs of his treatment having to be met through his owners, and there would be a risk of discouraging him from taking treatment. Accordingly, he was treated free of charge.

Professor Nocht stated that at Hamburg the port doctor had to visit each ship about every two days whilst in port, and send to hospital any infected sailor, if he considered it necessary. The costs of treatment devolved upon the police authorities, who were reimbursed by the consulate, the shipowners or otherwise. No sailor infected with a serious disease could remain on board a ship.

M. Velghe said that he did not know why the Norwegian Red Cross had taken the initiative in this Conference. He was very glad that the Committee would be represented by its President, for it might be possible, thanks to his presence, to ensure that the existing organisations would not be forgotten when resolutions were being adopted at Oslo. In many countries there were institutions which were open to sailors and it was questionable whether, as regards these countries, there was any need to touch the matter at all. In any case, it was to be hoped that the initiative of the Norwegian Red Cross would be linked up with that taken by the central and local administrations. To ignore what had already been done would cause confusion instead of encouraging a co-ordination of effort.

Sir George Buchanan thanked the President for his explanation. He understood that the British Government had decided not to send an official representative to the Conference. The matter concerned the Red Cross, and it was desirable to leave the initiative with them. The Committee, however, should be kept advised of this work. He presumed that the President would attend as an observer, rather than as an exponent of the views of the Health Organisation.

The President explained the initiative taken by the Norwegian Red Cross. Norway had a large number of sailing ships, which did not return to the country sometimes for years, so that Norwegian sailors were exposed to the most difficult navigation conditions. New measures in favour of sailors might not be of any use either in France or in Germany, but it might be otherwise in the ports of other countries. His colleague, M. Velghe, had pointed out that the Red Cross should avoid any lack of co-ordination with what had already been done. The President would take note of the feeling of the Oslo Conference and whether it might be desirable for the Committee to associate itself with the movement some day or other.

It was decided to ask the President to attend this Conference.

3. *Third International Congress upon "First-Aid in Accidents"* (*Amsterdam, September 7th to 11th*, 1926).

Dr. Jitta was asked to attend on behalf of the Health Committee.

4. *Fifth Meeting of the "International Anti-Tubercular Union"* (*Washington, September 30th to October 2nd*, 1926).

Surgeon-General Cumming, who would be attending this Conference, agreed to represent the Committee.

5. *Second Conference of the Far-Eastern Red Cross (Tokio, November 15th to 25th, 1926).*

Dr. TSURUMI, in the name of his Government, extended a cordial invitation to the Committee to be present at this Conference, and hoped that some of his colleagues could attend.

The PRESIDENT warmly thanked Dr. Tsurumi for this invitation.

It was agreed that a medical officer from the Singapore Bureau would be delegated to attend.

6. *Conference of the "China Medical Association" (Peking, September 1926).*

Sir George BUCHANAN asked whether it would be in order for the Committee to send a representative to a conference held by a national association.

Dr. RAJCHMAN explained that the Association in question was principally composed, not of Chinese doctors, but of foreign doctors practising in China, and that they could only belong to this Association if they possessed special qualifications. When he was in Peking, the President of the Association had suggested to him that this Conference would provide a fresh opportunity for the interchange of information concerning epidemic diseases. He had therefore thought it desirable that a medical officer from the Singapore Bureau should attend on the occasion of a voyage in this locality.

The Committee agreed.

7. *Ninth Conference of the Association of French-speaking Doctors in North America (Montreal, September 21st to 23rd, 1926).*

At the suggestion of the President, *it was decided* to ask Professor Léon Bernard to attend this Conference, on the assumption that, during the course of his journey in America, he would have occasion to visit Canada.

Dr. GRANVILLE asked whether there was any information available concerning the status of this Association.

Dr. VELGHE replied that it seemed to be an important organisation. At any rate, the Canadian Government gave its official support to the Conference and had urged the European Governments to send representatives to attend the proposed meeting.

229. Foundation of the "Darling" Medal and Prize.

Dr. RAJCHMAN read his note upon the subject (Annex 101).

The proposals of the Medical Director were approved.

230. Leishmaniosis.

Professor PITTALUGA commented on a short note (Annex 102) which he had prepared on this subject, in which he had contented himself with explaining the present state of the work with which he and Dr. Raynaud had been entrusted. He wished particularly to pay a tribute to Dr. Charles Nicolle, of whom it was sufficient to say that his theories had dominated for twenty years all research work on leishmaniosis. Though he (Professor Pittaluga) and his colleague, Dr. Raynaud, had attempted to co-ordinate the efforts of workers in this sphere, Dr. Charles Nicolle should be specially invited to carry out this research.

Dr. RAYNAUD thanked Professor Pittaluga, in the name of Dr Charles Nicolle and of his country. It was his intention to get into touch with Dr. Charles Nicolle and ask him to be good enough to draw up a programme for research and enquiry. He had profited by the interval between the two sessions to make enquiries concerning both cutaneous and visceral leishmaniosis and he had prepared a note (Annex 103) concerning cases of kala-azar which had been observed in Provence, and on the frequency of Oriental sores in Palestine. He was convinced that, by placing these researches in the charge of Dr. Charles Nicolle, more complete information would be forthcoming.

231. Port Health Procedure.

Dr. RAYNAUD proposed a resolution arising out of the discussion on his report on the Mediterranean study tour, which was supported by Professor CANTACUZÈNE and Surgeon-General CUMMING.

This draft resolution was referred to the Drafting Committee.

SEVENTH MEETING

Held on Saturday, May 1st, 1926, at 10 a.m.

Present: All the members of the Committee, except Dr. Alice Hamilton, Professor Ottolenghi and Dr. Mimbela.

232. Report to the Council on the Work of the Sixth Session of the Committee.

A draft report on the work of the sixth session was read.

Resolutions I to V were adopted with slight drafting amendments.

Resolution VI. Singapore Bureau.

Professor CANTACUZÈNE, referring to the last paragraph but one of the resolution, asked that the following words be deleted: "against acute intestinal infections". The administration of vaccines by the mouth might, in fact, concern other infections.

Dr. RAJCHMAN remarked that the meeting was ruled by the terms of the recommendation of the Advisory Council so far, at least, as the beginning of the enquiry was concerned.

Professor CANTACUZÈNE asked if, under these circumstances, plague was to be excluded from the research work.

Dr. RAJCHMAN replied that for the moment it was simply a matter of co-ordinating research work now being done.

Resolution VI was adopted.

Resolution VII: Work of the Malaria Commission.

Dr. LUTRARIO considered that the text of the resolution was too vague.

"The Health Committee adopts the report of the Malaria Commission and decides to support the recommendations contained in the accompanying annex."

It was necessary to define what was being referred to in the annex and to mention in particular induced malaria for the treatment of certain nervous diseases. The request to the Medical Director to find means of providing a certain quantity of cupreine should also be mentioned.

Dr. RAJCHMAN asked Dr. Lutrario not to insist upon his proposal. The necessary references appeared in the Minutes.

Professor NOCHT proposed that the recommendation made concerning induced malaria be discussed again by the Malaria Commission at its next session.

Dr. RAYNAUD supported this proposal. The text of the resolution contained no restriction, and consequently would include all proposals contained in the report.

On the motion of Dr. GRANVILLE *it was decided* to delete the second part of the resolution, from the words "and decides".

Sir George BUCHANAN did not consider it necessary to address a letter to the Administrations; the same result would be obtained by sending them the report. He supported the proposal of Professor Nocht.

Dr. RAJCHMAN pointed out that this proposal was equivalent to a reopening of the question.

Professor PITTALUGA understood that Professor Nocht's intention was not to invalidate the previous decisions of the Committee. It might perhaps be well to add to the text of the resolution a note defining the sense of the suggestions addressed to the Governments. If necessary, the Malaria Commission could discuss the question again.

Dr. RAJCHMAN insisted that the Committee should give the Secretariat precise instructions.

Professor NOCHT considered that it would be well to discuss the question again in the Malaria Commission. At the same time, it was not possible to go back upon a decision once taken. If a note were added to the resolution, it would consist of a recommendation to the Governments to the effect that the treatment in question was only for special cases in special hospitals; such methods should not be open to just any doctor; as a matter of fact there was too general a tendency to adopt this method.

Professor PITTALUGA remarked that the decision already taken implied the possibility of addressing a more definite invitation to the Governments.

Dr. LUTRARIO thought the question was merely one of form. If the annex were mentioned in the resolution, the points dealt with therein should be definitely stated. If it were not mentioned, the fact that the report was adopted would signify that the annex was also adopted.

Dr. RAJCHMAN expressed the opinion that it was essential for the Secretariat to know in what terms to draft the letter to the Governments. In order not to reopen the debate, he proposed that the Chairman of the Malaria Commission, in collaboration with his colleagues and with the Bureau, should define the exact text of the Annex.

Dr. LUTRARIO asked why there was no resolution on the subject of trachoma.

Dr. RAJCHMAN replied that resolutions were not necessary with regard to interim reports.

Resolutions VIII to XIII were adopted without observations.

The report as a whole was adopted (Annex 105).

233. The Question of Malaria in Albania.

Professor CANTACUZÈNE stated that, after the voyage to Albania of Dr. Gauthier, Director of the Red Cross League, this organisation, in agreement with the Albanian Red Cross, had undertaken in the country an educative campaign, through the medium of publications, conferences, etc., in favour of anti-malarial propaganda, and had founded at Tirana a School of Nursing, directed by a French nurse, of which the League of Red Cross Societies undertook the direction for three years.

234. Close of the Session.

The PRESIDENT expressed the opinion that the work of the Health Committee was progressing satisfactorily. As usual, he referred in particular to the work of the Technical Commissions, and not least that of the Malaria Commission, and rendered homage to the fertile activity of the Medical Director, whose report upon his voyage to the Far East was the most outstanding feature of the session.

Dr. JITTA, in the name of his colleagues, congratulated the President upon the friendly yet firm manner in which he had directed the work of the session. If his colleagues, after each session, felt satisfaction at the results obtained, they were in great measure due to the President and to the Medical Director.

Sir George BUCHANAN associated himself with these observations.

Dr. GRANVILLE remarked that, after an absence of two years, he was really astounded at the progress made by the Committee.

ANNEXES

C.H. 415 (2).

Annex 78.

AGENDA OF THE SIXTH SESSION OF THE HEALTH COMMITTEE

Geneva, April 26th to May 1st, 1926.

Monday, April 26th, at 3 p.m.

Report by Dr. Raynaud on the collective study tour arranged by the Health Committee in the Mediterranean Ports.

The problems of child welfare and the studies of infant mortality.

The International List of Nomenclature of Causes of Death.

Budget estimates for 1927.

Tuesday, April 27th, at 11 a.m.

Public health problems in the Far East and the First Session of the Advisory Council on the Singapore Bureau.

Wednesday, April 28th, at 10 a.m.

Report of the Malaria Commission.

Reports by Dr. Lutrario and Dr. Jitta on trachoma.

Report by Professor Chagas on leprosy.

Thursday, April 29th, at 10 a.m.

Report by the Medical Director.

Friday, April 30th, at 10 a.m.

Miscellaneous.

Resolutions adopted by the Session.

Saturday, May 1st, at 10 a.m.

Adoption of the resolutions.

C.H. 441.

Annex 79

COLLECTIVE STUDY TOUR

Organised by the Health Committee of the League of Nations in the Mediterranean Ports from November 10th to December 24th, 1925.

GENERAL REPORT BY DR. LUCIEN RAYNAUD,

Inspector-General of the Health Services of Algeria, Member of the Health Committee of the League of Nations, President of the Mission of Enquiry.

Algiers, March 24th, 1926.

CONTENTS.

I. Introduction.

At its session in October 1925, the Health Committee of the League of Nations decided to organise a collective study tour open only to the heads of Maritime Sanitary Services. It felt that, in addition to the exchange of medical officers of health, which had hitherto been confined to the land health services, it was desirable, now that an international health conference was being prepared for the purpose of revising the provisions of the Sanitary Convention of 1912, to invite the directors of maritime sanitation to undertake a tour first in the Mediterranean and later in the North Sea and the Baltic.

The latter tour had to be postponed and only the Mediterranean tour was carried out.

It has certainly been of value to visit the various port organisations (which have been discussed at numerous conferences) and to set out, at the end of the tour of inspection, the methods adopted in each country.

The examination of the equipment and the working of the services and daily contact between officials of the various nations whose duty it is to receive vessels coming from ports for the supervision of which their travelling companions are responsible, has dispelled many suspicions and established ties of confidence and sympathy — it would not be too much to say of cordial friendship. Greater facilities will certainly be accorded to shipping, and maritime trade and international relations will benefit thereby. Whatever may be the degree of perfection attained in each service, further improvements are sure to be introduced in its organisation and working, because our members admired — and will certainly endeavour to imitate — certain practical details observed on the tour, which rendered operations easier and eliminated irksome formalities, without in any way weakening the guarantees which are indispensable for public health.

Finally, the officials whose duty it is to apply the international regulations were able, in the course of the tour, to form an opinion as to the vagueness of these regulations and the difficulty of putting some of their provisions into practice ; they were able to discuss these matters and offer suggestions.

Although they were not officially authorised to submit their observations, they feel that their opinion on certain questions, such as bills of health, consular visas, procedure for the deratting of vessels, the supervision and destruction of rats, etc., may, based as this opinion is on long practical experience in the sanitary supervision of vessels and ports, perhaps be read with interest by the members of the Sanitary Conference.

In this report, therefore, we venture to offer a few remarks on the points which especially struck the members of our mission.

Members who took part in the study tour.

Algeria.	Dr.	Massonet, Director of Health, Algiers, Assistant Inspector-General of the Health Services of Algeria.
France.	Dr.	A. Raybaud, Head of the Laboratory of the Maritime Sanitary Service of the Port of Marseilles.
	Dr.	George Ribot, Director of Maritime Health, Marseilles.
Great Britain.	Dr.	P. G. Stock, Medical Officer, Ministry of Health, London.
Greece.	Dr.	J. Pappathanassiou, Medical Director of the Piræus Lazaret.
Italy.	Dr.	Ghiglione, Head of the Sanitary Service of the Port of Genoa.
	Dr.	C. Giglio, First Assistant Medical Officer, Messina.
Spain.	Dr.	Mestre y Peon, Inspector-General of External Health, Ministry of the Interior, Madrid.
Syria.	Dr.	A. Cherif, of the Quarantine Service, Beirut (Syria).
Kingdom of the Serbs, Croats and Slovenes.	Dr.	Trausmiler, Head of the Bacteriological Station of Kraljevica (Kingdom of the Serbs, Croats and Slovenes).
Representatives of the Health Organisation.	Dr.	J. Calo, Ship's Doctor of the Lloyd Triestino, temporary Member of the Health Section of the League of Nations, Administrative Director of the Tour.
	M.	Palomba, Secretary of the Inspectorate-General of Hygiene at Algiers, Secretary of the Tour.
	Dr.	Lucien Raynaud, Inspector-General of the Hygiene and Public Health Services of Algeria, Member of the Health Committee of the League of Nations, President of the Mission.

Dr. Ribot only visited the ports of Barcelona and Algiers. Dr. Massonet and Dr. Raynaud only joined the group at Algiers, while Dr. Cherif left the party at Haifa, having been recalled by his department at Beirut. Dr. Thomson, President of the Maritime and Quarantine Medical Council of Egypt, who was to have taken part in the tour, was prevented at the last moment.

Itinerary of the Study Tour.

Date and Place visited.			Length of Stay.	Observations.
November :				
Tuesday	10th	Barcelona	2 days......	Barcelona-Marseilles, night 11th to 12th.
Wednesday	11th	»		
Thursday	12th	Marseilles	2 days	
Friday	13th	»		
Saturday	14th	....		Marseilles-Algiers : by steamer.
Sunday	15th	....		Arrived at Algiers.
Monday	16th	Algiers.	3 days.	
Tuesday	17th	»		
Wednesday	18th	»		
Thursday	19th	....		Algiers-Marseilles : by steamer.
Friday	20th	....		Arrived Marseilles.
Saturday	21st	....		Marseilles-Genoa : by rail.
Sunday	22nd	Genoa	2 days.	
Monday	23rd	»		
Tuesday	24th	Rome	1/2 day......	Rome-Naples : by rail.
Wednesday	25th	Naples	2 days.	
Thursday	26th	»		
Friday	27th	....		Left for Alexandria by the S.S. *Esperia.*
Saturday	28th	....		At sea.
Sunday	29th	....		At sea.
Monday	30th	Alexandria.	Arrived in the morning ; visited Alexandria.	
December.				
Tuesday	1st	Alexandria		Left in the evening for Cairo by rail.
Wednesday	2nd	Cairo	2 days.	
Thursday	3rd	»		
Friday	4th	....		Left for Suez and Tor.
Saturday	5th	Tor.		Left in the evening for Suez.
Sunday	6th	Suez		Evening, left for Haifa.
Monday	7th	Haifa.		
Tuesday	8th	....		Left for Port Said.
Wednesday	9th	Port Said................		Left for the Piræus in S.S. *Fezara.*
Thursday	10th	....		At sea.
Friday	11th	Piræus		Arrived at Piræus, Athens.
Saturday	12th	»	(Salamis Lazaret)	
Sunday	13th	»		
Monday	14th	....		Left for Salonika.
Tuesday	15th	Salonika.	....	Evening, left for Trieste by rail.
Wednesday	16th	....		En route.
Thursday	17th	....		»
Friday	18th	Trieste	2 days.	
Saturday	19th	»	....	Left for Venice.
Sunday	20th	Venice	2 days.	
Monday	21st	»	....	Left in the evening for Geneva.
Tuesday	22nd	Geneva		Conference on ports visited.
Wednesday	23rd	»	....	Broke up in the evening.

How the Mission of Enquiry was received.

The mission met with a most cordial reception at every stage of its tour ; official receptions were arranged for it by Governments, municipalities, Chambers of Commerce and health and port authorities. A number of private receptions were also given in its honour. It would take too long to name all the persons who did their utmost to facilitate the task of the delegates of the Health Committee, and there would be a danger of our overlooking some. We are in duty bound, however, to mention the Governments and Health Administrations of Spain, France, Algeria, Italy, Egypt, Palestine and Greece.

His Majesty King Fuad did the President and two members of the mission the honour to receive them in private audience, thus furnishing proof of his deep interest in health questions, and His Excellency Dr. Mohamed Shahine Pasha, Under-Secretary of State for Health, explained to us in great detail the whole central health organisation of Egypt. The Greek Minister of Health, H.E. M. Philandros, also received the International Health Delegation, which is grateful for all the kind attention it has received.

Our special thanks are also due to Dr. Murillo, Director-General of Health, *in Spain*; Dr. de Messea, Director-General of Health, and M. de Michelis, Commissioner-General for Emigration, *in Italy*; Dr. Thomson and the International Medical Council at Alexandria and the President of the Suez Company *in Egypt*; Dr. Heron, Director of the Health Service, *in Palestine*; and Dr. Copanaris, Director of Health *in Greece*. Dr. Copanaris accompanied us as far as Salonika, and we noted with admiration the magnificent result of the efforts made to house, feed and care for 1,500,000 Greek refugees expelled from Asia Minor and Thrace.

Distribution of the Reports.

By common consent it was decided that each of the members should prepare a report on one of the ports visited, and that in addition certain papers might be submitted on special points. Consequently, the reports were allocated as follows :

Dr. Raybaud	Study of the Port of Barcelona.
Dr. Ghiglione	» » » » Marseilles.
Dr. Mestre	» » » » Algiers.
Dr. Massonet	» » » » Genoa.
Dr. Chérif	» » » » Naples and Haifa.
Dr. Stock	» » » » Alexandria.
Dr. Pappathanassiou	» » Medical Stations at Tor, Suez and Port Said.
Dr. Giglio	» » Piræus and Salonika.
Dr. Trausmiler	» » Trieste and Venice.

In addition, Dr. Stock undertook to prepare a paper on the methods of deratting vessels by sulphurous and cyanhydric gases, and Dr. Raybaud on the rat campaign in ports and maritime towns from the point of view of sanitation.

At a Conference held at Geneva on December 22nd and December 23rd at the end of the tour, each member of the mission, except Dr. Chérif, who was absent, presented a summary of the principal facts which had been noted in visiting the ports. The complete reports are attached to the present document. They contain full information regarding not only the maritime sanitary organisation and protective measures against the various plague-like infections, but also the visits to general or special hospitals and other public or private relief or health establishments.

We do not propose to discuss the facts set out in the various special reports — it would be mere redundancy to do so. We will deal with certain general questions, which we think merit more careful consideration, and will endeavour to arrive at practical conclusions and to make suggestions for international regulation.

* * *

II. Administrative and Medical Organisation in the Ports.

The administrative and medical organisation of the ports visited by the mission differs in every country, and sometimes even in different ports in the same country.

In most cases the port administrations are under the jurisdiction of the Ministry of Public Works : in Italy, however, and in Greece, the Admiralty is responsible. Certain ports are practically autonomous — Barcelona, in which the *Junta del Puerto* is responsible for the management, and Genoa, which is managed by a *Consorzio Autonomo di porto*.

The staff of the maritime medical service is under the Ministry of the Interior (Health Department) in Spain and in Italy; the Ministry of Health in France; the Admiralty in Greece; and in Egypt the International Maritime Medical Council of Alexandria.

Except in Italy and Greece, directors and medical officers pass their whole careers in the maritime health service. In Italy, the Government nominates at its discretion provincial *medical officers* to take charge, provisionally or permanently, of some particular maritime sanitary directorate. If the latter are only used to the measures of prophylaxy adopted on land, they may at first be somewhat perplexed by the new regulations and special measures which have to be adopted in the case of vessels. In Greece a few months ago, the permanent medical staff of the maritime sanitary service was replaced by young medical officers of the Navy. It is to be feared that the frequent changes in the posts may adversely affect the continuity which is so desirable in port health administration.

Lazarets, Stations and Hospitals for Infectious Cases; Anti-venereal Dispensaries.

Spain possesses *two lazarets*: one at *Mahon* for plague and cholera and another at *St. Simon*, near Vigo, on the Atlantic, where new arrivals suspected of suffering from yellow fever are mainly sent. Barcelona, moreover, has a *medical station* in the outer port and a *hospital for infectious diseases*, in which both seamen and passengers are received.

Marseilles possesses the *lazaret of Frioul*, which is well isolated on an island, and it is there that patients from vessels are sent.

Algiers possesses, in addition to the *lazaret of Matifou*, which is mainly intended for the reception, observation and disinfection of Moslem pilgrims on their return from Mecca, a *medical station* in an isolated part of one of the moles and a *hospital for infectious diseases* (El Kettar), which receives patients from the ships and also from the town.

In Italy, there is a *lazaret at Trieste,* which is used more particularly for emigrants, and one at *Venice;* both are exceptionally well organised and even luxurious. Trieste and Venice also possess hospitals or isolation services like most of the other maritime towns.

The sanitary station at Genoa has only twelve beds and observation premises for two hundred persons, with apparatus for disinfection and delousing. The Hospital of St. Martino, however, possesses the most complete and modern organisation for dealing with contagious cases.

In Naples there is a delousing station on the mole, and in the town there is a hospital in which about 1,000 patients can be isolated.

It should also be mentioned that in Italy there are emigration organisations (*case di Emigranti*) at Genoa, Naples and Trieste, to which we shall refer later.

The lazaret on the shore at Haifa and the disinfecting stations are in constant use for emigrants.

Egypt possesses several lazarets ; that at Tor, on the Red Sea, is the largest and can accommodate several thousand pilgrims ; there are also the lazarets and sanitary stations of Mafrussa and Gabarri (Alexandria), Moses' Wells and El Ghart at Suez, and, lastly, the Port Said station.

The *Fever Hospitals* of Suez and Port Said are particularly interesting to visit.

The lazarets of St. George (Salamis) and Kara Burnu (Salonika) have of recent years received, deloused, isolated and observed hundreds of thousands of Greek refugees, and have protected the country from infectious diseases.

In most of the ports there are organisations for the campaign against *venereal diseases* among seamen. The mission visited the dispensaries at Algiers, Marseilles and Naples, and the admirable hospital for venereal diseases under the direction of Professor Photinos at Athens.

Finally, certain ports have made special sanitary arrangements for lightermen and shipping workers ; the Coal Importers Co. of Barcelona has displayed admirable initiative in establishing for its employees 172 lavabos with running water and unlimited supplies of soap.

Protection against Plague.

A. *Measures adopted with Regard to Vessels.*

In all ports, the mission noted that steps were taken against plague, more particularly in the case of vessels coming from suspected places. Some of these measures, which had been in force since 1900, are meaningless, such as the guards fixed on mooring hawsers in order to prevent rats leaving the ship. Every sailor has witnessed rats leaving a vessel — the animals jump from the ship and swim to land, entirely disregarding the hawsers. Vessels are often anchored end on, that is to say, at right angles to the quays, which means that they are further off than when moored alongside ; but the gangways and the lighters which connect them with the land or float alongside, and which, in spite of the regulations, are not removed at night, make it possible for rats to enter or leave the vessels.

But what is the use of regulations which are applied only to vessels coming from ports declared infected ? It is an admitted fact that every Mediterranean port has at some time or other suffered from plague among rodents or human beings. Such being the case, can it be affirmed with any certainty that plague has not continued to exist among the rodents in a latent and chronic form, or can it be denied that new acute outbreaks may occur ? At any rate, these rat germ-carriers, when transported elsewhere, are infectious.

In reality, it would seem that all ports are equally dangerous and that measures should be taken to make it practically impossible for rats to pass from one country to another, or live on the quayside or in its vicinity. We cannot too highly recommend the arrangements, described by Dr. Norman White in his Far Eastern tour, which have been made in certain Indian ports to prevent rodents reaching the stocks of cereals ready for export.

Regulations concerning the deratisation of national vessels vary : in some countries the destruction of rats must be carried out once a year, in others, every six months or every three months, and even (in Greece) every 45 days ; vessels coming from infected or suspect areas are fumigated on each voyage. This deratting is carried out by means of vaporised hydrogen-cyanide or sulphur anhydride (Clayton and Blanc apparatus) or the burning of sulphur and carbon or liquid SO_2.

Sometimes the whole of the vessel is fumigated, sometimes only part, and the holds may be full or empty. We shall return to this subject later.

B. *Measures on the Quayside and in the Town.*

In almost all ports there is some control kept of rats along the quayside — that is to say, dead rats are collected for examination. Special arrangements are made to kill, or rather capture, a number of rats every day, and these animals, examined in the laboratory, furnish an indication as to sanitary conditions in the sewers, etc.

In certain ports, such as Naples and Barcelona, the sewers of the port quarters do not communicate with those of the rest of the town. Most maritime towns now merely collect the corpses of rats found in the streets and warehouses, but no longer attempt to organise the methodical destruction of rodents throughout the whole town.

It must be admitted that attempts to exterminate rodents do not seem to have produced lasting results in any direction ; the rats are so prolific that, given favourable conditions — shelter and varied and abundant food — they continue to multiply in spite of all attempts to exterminate them.

It would therefore seem that efforts should be directed rather towards eliminating all possible shelter for rats and placing all foodstuffs beyond their reach. This method has already been adopted by certain authorities ; in particular, the "*Junta del Puerto*" at Barcelona has gradually transformed the sheds and warehouses along the quays into reinforced concrete buildings with tiled flooring, which are rat-proof. Warehouses and corn silos in the ports of Genoa and Naples are built on similar lines. But, unfortunately, in these same ports, alongside the docks so carefully protected from rodents, are to be seen numbers of wretched buildings and wooden huts which are used as shops and offices, and we noticed similar conditions in the other ports visited. All of these premises provide the rats with shelter and an abundance of food.

We would refer the reader to the carefully annotated paper by Dr. Raybaud on this subject.

C. *Examination of Rats.*

All ports possess laboratories for the examination of rats. Sometimes it is the Maritime Sanitary Service which captures the animals on the vessels, on the quayside, and in the town, and which verifies their condition (Marseilles, Algiers and Barcelona) ; sometimes it is the municipal or port administration which collects the rodents, while the State laboratories, the Faculty of Medicine, Bacteriological Institutes, etc., examine them. But, in spite of all the care exercised, it often happens that cases occur among human beings before there is any suspicion of an epidemic amongst the animals underground. At other times, on the contrary, only cases among rats have been noted. For instance — and this is a matter which considerably surprised the mission — in 23 years at Genoa, Professor Canalis has observed 20 plague epidemics among the animals without any infection of human beings.

Professor Canalis and his assistant, Dr. Piras, think that the flea of the rat transmits plague only in very rare cases, and that it is direct contact with infected matter which produces the disease in man.

Professor Puccinini, at Naples, also expressed a similar opinion ; he considers that it is flour and grain contaminated by the excrement of rats which infect man. These facts are quite contrary to the results of numerous and repeated experiments to which we cannot refer here without discussing them. If the above theory were proved, we should have to revise the whole system of anti-plague prophylaxis.

D. *The Fumigation of Vessels.*

Like the English, we apply the word "fumigation" to the destruction of rats on board ship by means of toxic vapours. The catching of rats with hoop-nets and traps and with poison traps are measures to be employed on the quays and in the various parts of the towns.

Sulphur fumigation. — Marot and Clayton apparatuses have for some time now been in use in France and Algeria. Everywhere during our tour we noticed that the Clayton apparatus was that used for the production of SO_2. Sometimes it is the Sanitary Service itself which sees to this matter and sometimes the work is carried out by private companies, though under State supervision.

In Algiers and Marseilles, shells of *liquid* SO_2, of 4, 10, 50 and 100 kgs., placed at various depths in the holds of the vessels, are in current use. At Algiers we saw in use in the workshops of the P. L. M. Railway, an apparatus of the "Société du Gaz sulfurique" which is employed for the destruction of vermin in the carriages. There are also several types of this apparatus in use in the colonies for the fumigation of vessels.

At Genoa, in addition to the Clayton apparatus, the maritime sanitary service often fumigates by burning sulphur and carbon in large buckets, which are lowered into the holds.

Fumigation with hydrogen cyanide. — Two methods were demonstrated to the mission. The more practical, which also seemed easier from the point of view of manipulation and less dangerous for the operators, is that employed in Spain and known as the Grima apparatus. By this method, the hydrogen cyanide gas is generated outside the ship in a closed receptacle ; it is passed into the holds through pipes. After the gas has been there a sufficient time, the doors and hatchways are opened and the gas, which is lighter than air, rapidly escapes. Guinea pigs are then let down to different depths to make sure that no poison gas remains ; then the crew are allowed in. In cabins where the gas might be retained rather longer in the hangings and mattresses the danger is sometimes neutralised with a product containing formaldehyde. Although thousands of ships have thus been deratted, there has never been an accident. The State has provided all Spanish ports with this apparatus, which belongs to the State, and the operations are carried out by agents of the Sanitary Service. In Italy, at Genoa, Naples and Trieste, the captain is allowed to choose between sulphur fumigation and the hydrogen cyanide method, but in both cases private companies carry out the operations.

The hydrogen cyanide is produced by immersing packets of cyanide of potassium in a bucket containing a solution of sulphuric acid. These buckets are placed in the spots to be deratted by employees wearing masks, who make the mixture and then leave. After some time has elapsed they take off the hatches to let the gas escape ; sometimes they neutralise it and then go down to fetch the buckets.

We cannot help feeling that this method is less sure and more difficult to operate than the Grima method ; certainly fatal accidents have occurred, in particular at Trieste. They would seem to be due to carelessness, which is bound to occur sometimes, and perhaps also to unknown reasons which it would be desirable to ascertain — for instance, the dampness of certain parts of the vessel which might retain the hydrogen cyanide for a longer period.

Regulation of the fumigation of vessels. — International sanitary regulations either prescribe or recommend the fumigation of vessels ; certificates of deratisation are provided showing the number of rats killed, a number which varies greatly and is generally very small. The Sanitary Administration generally accepts these certificates without taking any steps to ascertain whether the operation was carried out in all the holds and other parts of the vessels, or only in some, or whether it was effected before or after unloading and whether the result was proportionate to the cost involved.

The mission discussed this question on several occasions and instructed Drs. Mestre and Stock to submit a report ; in this report, which has been drawn up by Dr. Stock, will be found full information on the various methods at present adopted to fumigate vessels. But many questions of great interest to public health have still to be examined, and it would be desirable for an international commission consisting of health directors, engineers, ships' captains and chemists to conduct a series of experiments on the following points :

> What are the most effective gases for the destruction of rats and vermin ? What methods are best and least dangerous to man ? Are any of these methods likely to damage goods or foodstuffs ? Under what conditions should the vessel be fumigated ? Empty ? In cargo ? What are the goods and kinds of cargo (packages leaving space for the passage of gas, or cargo in bulk, corn, etc.) which make it possible to fumigate full holds ? Is the partial fumigation of a vessel any use ? Should lacrymogene gases for revealing the presence of cyanide be used, together with the toxic gases ? Finally, what are the costs ?

If all these points of the problem could be solved, the deratting of ships could be standardised and satisfactorily regulated [1].

III. Migrations, Pilgrimages, Emigrants, Refugees.

We have been able to study the conditions under which large migrations take place periodically or occasionally ; we feel bound to refer to this question here on account of the relationship which exists between this problem and that of public health, and the effect which these migrations may produce on health, not only in the countries traversed, but throughout the Mediterranean.

A. *Pilgrimages to Mecca and Medina.*

Once in his life the Moslem must visit the holy places of Mecca and Medina. At the season of pilgrimage, a vast multitude of travellers of all nations — some one to two hundred thousand pilgrims — assembles from the most distant countries, carrying with them germs of every kind. The heat, the overcrowding, the lack of water (or impure water), the fatigues and privations, sow the seed of epidemics, which have frequently spread from this centre into Asia, Europe and Africa. The epidemics of plague which invaded Northern Africa and the Mediterranean Basin during the whole of the period of the Barbary pirates and most of the invasions of cholera from which Europe suffered in the nineteenth century had their starting-point in the Hedjaz.

It was about the year 1858 that the Egyptian Health Department, created eight years previously, decided for the first time to supervise the pilgrimage to Mecca. The station of Tor at the foot of Mount Sinai in the Gulf of Suez was first used in 1862 and El Vej in the following years. The Conference held at Constantinople in 1866 laid down regulations governing the return of pilgrims after their stay in the Hedjaz, the periods of quarantine they had to undergo and the vessels conveying them.

In 1880, the Health Department was transformed into the *International Maritime and Quarantine Board of Alexandria* and undertook the defence of the sea and land frontiers. This Board drew up detailed regulations, which were confirmed by the Venice Conference in 1892 and still have force of law.

At present no Egyptian Moslem can leave for the Hedjaz until he has been examined, found to be in good health, and inoculated against smallpox and cholera ; he must be provided with a passport, and have sufficient money for the journey, and his family must be able to support itself during his absence.

If he leaves by sea, the vessels are subject to regulations fixed by international conventions ; they land their passengers at Jedda, the port for Mecca, and at Yambo, the port for Medina.

Sanitary supervision in these ports and in these two towns is practically non-existent, despite the presence of Moslem doctors, and the health of the pilgrims is not so good on the return journey. A period of quarantine at Tor after a pilgrimage is compulsory ; its length varies according to the health conditions of the Hedjaz and that of the passengers of each vessel. We do not propose to describe the organisation or working of the Tor quarantine station or of those of the Egyptian ports, and refer the reader to the very full account by Dr. Pappathanassiou, who was for many years doctor and director of the quarantine stations of Tor and Carzman.

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[1] The International Shipping Conference (London, 1924) and the Congress of the Merchant Marine International Association (Paris, 1925) both adopted a recommendation *"that the best methods for effective and practical deratting should be fixed by an international agreement"*.

The Egyptian pilgrims who land in Egypt pass through the disinfecting station of Suez; if there are any sick, they are isolated at *Moses Wells;* if they are in good health, they are sent home by special train, provided with a health passport, and are kept under careful observation. In 1923, out of 6,867 returned pilgrims, only one was lost trace of and could not be kept under supervision; in 1924 the whole 11,063 were traced and only 123 were found to be suffering from minor complaints. This shows how strict is the health supervision of pilgrims on their return from Mecca.

There is, however, another route for travelling to the holy places and returning — the overland route. The pilgrims are subjected to the measures described above both on leaving and returning; the stragglers, *i.e.*, those returning after Tor is closed, are received at *Moses Wells*. Foreign pilgrims are as a rule refused admission to Egypt.

The other Moslem countries have also issued regulations regarding the pilgrimage; the hajis of Morocco, Algeria and Tunis could only set out before the war after complying with certain conditions and in specially chartered vessels; on their arrival in their country, they were subjected to a second quarantine period and to disinfection at Tunis, at Matifou and at Tangier or Mogador. An organisation under the control of the *Habbus* has now been set up to facilitate the journey to the Hedjaz, but so far the political situation in Arabia has made pilgrimages on a large scale impossible.

The railway which before 1914 ran from Syria to Medina diverted a great part of the sea traffic. The Russian and Turkish pilgrims, including those from Asia Minor, together with a certain number of North Africans, travelled to the Hedjaz via Beirut; under Turkish rule they passed through the quarantine station of Tebbok on their return. The line has been interrupted in the neighbourhood of Maán, and it is no longer possible to go as far as Medina, but caravans start from Akaba or return thither, or pass through Palestine and Syria.

It would be well if the Paris Conference could take steps to secure the appointment of the Commission provided for in Article 17 of the Treaty of Lausanne for the co-ordination of pilgrimages.

B. *Pilgrimages in Palestine : Pilgrimages returning Overland.*

Palestine is a place of pilgrimage for Christians, Jews and Moslems. In addition, a large number of Moslems from Palestine travel to the Hedjaz and the country is crossed by foreign caravans proceeding to the holy places of Mecca and Basra.

1. The Christian pilgrimages are the least numerous. Formerly, Russians used to arrive to the number of 10,000 and often brought typhus, relapsing fever and cholera with them. At present the European pilgrims are of a better class and travel under more healthy conditions. The Abyssinians still give rise to some anxiety in this respect.

2. The Jews mostly come from Poland and Russia; they were formerly a great danger to public health; but the supervision exercised before their embarkation at Trieste and Constanza, examination, delousing and vaccination have reduced the danger. Those who come from Europe under the auspices of the Zionist organisations present practically no danger from the point of view of public health [1].

3. The Palestine Moslems who go to the Hedjaz are inspected, deloused and inoculated against smallpox and cholera; they travel overland or embark at Suez with the Egyptian pilgrims. On their return, those who undergo quarantine at Tor and an inspection at Suez are placed under observation for five days in Palestine.

4. Foreign pilgrims coming from the North, from India or from Persia through Basra or Baghdad pass through Palestine in ever-increasing numbers; some of them stop on the outward and return journeys at the Mosque of Omar at Jerusalem. An arrangement has been concluded with the Indian Government providing that the pilgrims from that country should be vaccinated and deloused before departure and should travel as far as possible by sea with a call at the quarantine station of Kamaran. If they made a detour to Jerusalem, they pass through Tor and Suez and are inspected at the sanitary post of El Kantara.

Syrians are detained for five days at the quarantine station at Haifa, but before being allowed to enter Syria, they are examined at the sanitary and quarantine station at Dera.

C. *Pilgrimage by Rail.*

The pilgrim traffic on the Hedjaz Railway is a matter of serious concern to the Palestine Government. The League Commission which visited the Near East three years ago had its attention drawn to this point, and its conclusion was that a single quarantine station for all pilgrims returning north should be established at Maán at the point of junction of the railway and of the road leading to the port of Akaba.

The Palestine Government having this year taken possession of Maán and Akaba according to the terms of the Mandate entrusted to it, preparations are being made to organise a quarantine station at Maán similar to that at Tor and a disinfection and observation station at Akaba.

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[1] Between 1919 and 1925, over 80,000 Jews came and settled in Palestine.

Before venturing on any judgment of the post of Maán, it would be necessary to know whether it is sufficiently far from any point of water or food supply to obviate the possibility of the pilgrims attempting to evade quarantine ; the quality and quantity of the water obtainable would also have to be ascertained.

If the Hedjaz finally settles down to peaceful conditions, it would perhaps be worth considering the re-organisation of the post at Tebuk, which must have dealt with a large number of pilgrims, judging by the following statistics of those passing through in 1909 on their return from Medina : Bokhariots 2,479, Persians 1,202, Russians 1,335, Irakis 321, Syrians and Palestinians 3,206, European and Asiatic Turks 2,800, Egyptians 796, Tunisians, Algerians and Moroccans 1,426. Moreover, this would in no way prevent the different Governments from maintaining stations at their frontiers to inspect pilgrims of their own nation, as is now done at Suez, El Kantara, Haifa, Dera (Syria), Tripoli, La Goulette and Matifou, despite the long quarantine undergone at Tor.

It would indeed be impossible to overdo the sanitary supervision of these numerous groups, travelling regardless of hygiene, almost all carriers of vermin and dangerous germs, particularly of plague and cholera.

What objection could be put forward against these measures, which health experts have always recommended in dealing with mass-movements of population, when precautions are daily taken in every part of the East against infection through passengers of all classes and coming from all parts of the world, even when travelling alone ?

In Palestine particularly, as in Egypt, all travellers, whatever their destination, who land or enter the country are placed under observation and subjected to health inspection, passport inspection and supervision for a number of days varying according to where they come from.

In Palestine, 93 per cent of these travellers have been traced or have presented themselves of their own accord for inspection after crossing the frontier ; in Egypt the proportion of native or foreign passengers who have undergone this inspection is as large as 99.2 per cent. This shows how strict a watch is kept for imported diseases in these two countries.

D. *Emigration.*

Italy is the European country which has hitherto sent out the greatest number of emigrants. Before the war their figure varies between three and four hundred thousand per annum. The United States have considerably reduced the number of admissions ; accordingly, new currents are setting in, one towards North Africa and the various countries of Europe, particularly France, and the other towards South America. The excess of births in Italy is over 250,000 per annum, and the country is unable to feed a population which grows at such a rate.

The Italian Government, from considerations of general policy, has regulated this emigration so as to spare its shipping companies, which are gradually setting up a monopoly, excessive return costs and fines [1] and to maintain enduring bonds of affection between these emigrants and the mother-country.

The emigration service is placed under the authority of a High Commissioner, Dr. de Michelis ; inspectors under his orders direct the offices of Genoa, Naples and Trieste ; at Palermo and Messina there are also emigration services of less importance, and an office is being set up at Fiume.

This service looks after the emigrant from the time he leaves his village until he reaches the frontier or port of destination, and protects him both from the moral and material point of view against persons attempting to exploit him and against infectious diseases, provides him with work and puts him in a position to hold out against the difficulties of all kinds which await him abroad.

The Board has accordingly created, in the districts from which the largest number of emigrants set out, special schools which teach the rules of cleanliness and hygiene necessary to health, the precautions to be taken to avoid exotic diseases, the care of women and children, and general knowledge concerning the countries to which they are proceeding.

When applying for his passport to the local authorities, the emigrant is examined ; the doctor certifies his good health, his fitness to endure the fatigues and climate of the country of destination, etc.

The emigrants as a rule arrive in groups at the port of embarkation : at the station they are met by agents of the shipping company and by emigration officers. They undergo a fresh medical inspection, shower baths, delousing of the body and scalp, and vaccination, and are then taken to hotels requisitioned and supervised by the Emigration Service or to the Casa dei Emigranti, or Emigrants' Hostel.

Their luggage is inspected and disinfected and, before embarkation, a fresh inspection is carried out by the medical officer of the Board, of the Public Health Service or of the shipping company and of the vessel in the presence of the American Health officer to detect cases of trachoma which may have escaped notice.

At last the emigrant arrives on board. Vessels engaged in carrying emigrants are specially fitted out and subject to very strict regulations ; emigrants, whether they travel fourth or third class, are supervised and inspected during the whole voyage.

Thanks to the kindness of M. de Michelis [2], we were able to visit in detail the whole orga-

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[1] Any person suffering from trachoma discovered on board renders the shipping company liable to a fine of 25,000 lire imposed by the American Health Service.

[2] M. de Michelis detailed Dr. Repetti to show us the whole emigration organisation ; we thank both these gentlemen for their great kindness and courtesy.

nisation at Naples and Trieste and we admired the order and precision with which all these operations were carried out. We were struck with the docility with which emigrants underwent all the long and minute health inspections. The women, many of whom travel second class, raise no objection to having their hair inspected and using all the lotions prescribed.

On the walls of the waiting-room of the Casa dei Emigranti are hung up notices like the following, "Cleanliness is health", "Remember that you are endowed with a Latin mentality : preserve it in the country in which you are going to live, and behave so as to arouse admiration for the civilisation of the country you are leaving".

The ports of Genoa and Naples are specially frequented by Italian emigrants going to North and South America ; Trieste is rather a port of transit for emigrants from Central Europe — Serbs, Croats and Slovenes, Poles, Czechoslovaks, Austrians, Russians, Roumanians, Orientals from Bessarabia and Syria and also Italians from the recovered districts. These emigrants are the clients of the Cossulitz Company, which lodges them in its splendid building, where there is room for 1,500 persons and where they are sheltered, cleaned and fed until their departure.

The Italian legislation extends its care and protection to all these foreigners passing through her territory ; it provides for sanitary supervision and inspection during their stay.

In addition to the passage of these emigrants bound for distant countries, mention should be made of the arrival and embarkation at Trieste of Zionist Jews bound for Palestine. They are received by the Italian Jewish Relief Committee, which takes charge of them, lodges them in an hotel containing 300 beds and hands them over to the Lloyd Triestino, which conveys them to Haifa, all the time under the sanitary supervision of the Emigration Board.

Thus about 10,000 emigrants leave Trieste for America and 4,000 for Palestine ; about 70,000 emigrants leave Naples each year. The figures for the other ports are smaller. The precautions taken before leaving the village, at the port of embarkation and on the way are such that it is extremely rare for an emigrant to be refused admission to the United States. Some idea of the minute nature of the health measures observed may be gained from the fact that in 1910, during the cholera epidemic which prevailed in Apulia, the emigrant traffic did not diminish, but special precautions were ordered and the American authorities made no objection to allowing free pratique to vessels coming from Italy, and no cases were transmitted.

E. *Greek Refugees.*

For several years fighting went on almost continuously. The Balkan War, the Great War and the Græco-Turkish War had gradually exhausted the resources of Greece. The deplorable disaster suffered in Asia Minor was followed towards the close of 1922 by the expulsion from the Turkish territories of an enormous number of Greeks, who began in the month of September to move in solid masses to the frontiers and the ports of the Piræus and Salonika. To these expelled Greeks must be added the fugitives strictly so called, and, later, the prisoners of war ; between 1922 and the end of 1924, a total of nearly 1,500,000 refugees were received in Greece.

No preparations had been made for their arrival ; the Treasury was empty. There was practically no health service and the organisation of the care required by these terrified, famine-stricken and destitute crowds, clad in rags and carrying with them the germs of all kinds of diseases, was almost as essential as the question of their accommodation and their food. At the same time steps had to be taken to protect the settled population, and also the countries maintaining relations with Greece, against plague, cholera, typhus, smallpox and the other infectious diseases which these refugees brought with them.

The League of Nations came forward and assisted in the issue of a loan to cover the costs of the repatriation, installation and care of these refugees, and sent out its Epidemic Commission. The American and Greek Red Cross Societies, the National Refugee Relief Association, and the League of Red Cross Societies gave valuable aid in money and goods ; medical missions came forward and offered their assistance. The Greek Government created an entirely new permanent health organisation ; a Ministry of Health was instituted, with a technical director, Dr. Phocion Copanaris, and a complete medical, administrative and executive staff (December 1922) [1].

At the outset, many fugitives poured in by land and took the wholly unprepared authorities by surprise. They brought with them typhus, which spread in Greece, where about 7,000 cases were reported. After that the authorities gained control of the situation ; order and methods were introduced and sanitary supervision and assistance organised. Observation camps and refugee stations were created ; every able-bodied person was given work, and, as new crowds arrived, satisfactory provision could be made for their needs. The repatriations took place regularly by sea, and the ships carrying the Greeks expelled from Thrace and Asia Minor were sent to the lazarets of St. George at Salamis (the Piræus) and Kara Bornou (Salonika).

We visited these institutions. The St. George lazaret, which is on an island, is well fitted out and has done excellent work. Between 1922 and the end of 1924, it dealt with

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[1] An account of the difficulties experienced by the Greek Government and the measures it adopted is given in the reports by Drs. Gauthier and Wroczynski, by Dr. Pittaluga and by Dr. Norman White. The very full report by Dr. Giglio is given as an annex thereto.

137,456 persons (men, women and children); on certain days it accommodated more than 24,000 at the same time. Shower baths, disinsectisation, disinfection, inoculation against smallpox and typhoid and occasionally against dysentery or plague, and supervision for a fortnight — such was the treatment which these unhappy people had to undergo. They were afterwards removed to camps, consisting at first of tents and later of huts made of wood and materials of all kinds, and finally accommodated in stone buildings. The Kara Bornou lazaret at Salonika is smaller and has only a temporary equipment which does not in any way resemble the permanent St. George organisations. This lazaret, however, received between 1922 and the end of 1924 a total of 120,315 refugees; on the day that we visited it 2,762 Greeks disembarked. They had been driven by the Turks towards the Caucasus and had then been expelled by the Soviets. A further 120,000 of these Greeks were expected from these districts, as well as 10,000 who were to be exchanged for Bulgarians.

Greece, for her part, sent away 200,000 Turks.

In the neighbourhood of Athens, the Piræus and Phaleron, and also on the outskirts of Salonika, these groups of refugees were accommodated in dwellings of every kind. We were amazed by the enormous and admirable effort made by Greece to organise these refugee camps and convert them in a short space of time into villages and regular cities. Some of these groups have been named after the districts from which the inhabitants came; *New Ionia* has a population of 35,000; *Philadelphia* has 30,000 inhabitants in a thousand one-storied houses, which will have been completed within a year, with all the necessary appointments — water, wash-houses, cesspools, ovens, a hospital with 150 beds, and various Government or Red Cross dispensaries with provision for general and special consultations for tuberculosis, trachoma, venereal diseases, diseases of children, gynæcology, etc.

At Salonika, in the immediate neighbourhood of the Kara Bornou lazaret, is situated the *Calamaria* camp, which is used for the observation of refugees. It can accommodate from 10,000 to 12,000 persons in its wooden huts and stone houses, and includes an isolation hospital which was formerly the English hospital.

The *Tumba* camp, which is intended to take 40,000 persons, cost 50,000,000 drachmæ; a small part is still of wood, the remainder being built of stone; 2,000 houses have already been erected and another 2,000 will be completed shortly. As a rule the dwellings consist of two rooms, a kitchen and w.c. for each family, the cost price being 31,800 drachmæ. Provision has already been made for water (five artesian wells), roads and a sewage system (4,000,000 drachmæ).

Refugees have the option of purchasing their houses by paying a sum spread over a large number of years. Side by side with these organisations in the neighbourhood of the towns, a large number of villages occupied by farmers have been erected in Macedonia, and this district, which, though fertile, is unhealthy and uncultivated, will be extensively exploited.

The sanitary services, under the direction of Dr. Copanaris, deserve the highest praise for the work they have done. No doubt cases of smallpox, typhoid and cholera have occurred, but as a result of the steps taken, these diseases have been quickly checked and not allowed to spread. The whole population of Greece has been vaccinated or re-vaccinated, and compulsory re-vaccination every seven years has been ordered by law. Buccal vaccine experiments appear to have given satisfactory results in the case of typhoid, cholera and dysentery; typhus has been finally checked by the delousing of all refugees.

There are still a number of important problems to be faced. Tuberculosis is very widespread and also malaria, which the Greek emigrants brought with them (40 per cent. were infected) or which they contracted in the Macedonian plains. In spite of all the labour and effort expended, much still remains to be done. The question of the water supply is also very important and is especially serious in the Athens-Piræus-Phaleron area. While at Athens a little water has been brought from the mountains, and while artesian wells have been sunk in a few of the new cities, there is no drinking-water either in the Piræus or Phaleron. It has to be brought in tank vessels at great cost and with great difficulty in small quantities from the island of Poros, three hours distant, and is then distributed in the streets. It will readily be understood that, in spite of chemical analysis and purification, water brought in this way is very dangerous and that it is impossible to ensure personal cleanliness or the cleanliness of dwellings and streets under these conditions.

Numerous sanitary institutions, including general hospitals, special hospitals, dispensaries, a Pasteur Institute founded with the assistance of the Greek Government and a generous contribution from Zaharof, and institutes of bacteriology, chemistry, etc., have been created at Athens; the other chief towns are also provided with a defensive organisation apart from the various sanitary services specially intended for the refugees installed in the new towns and villages, in which they occupy more than 200,000 houses or huts.

The impression conveyed by all these groups is one of intense activity. The settlements are connected with the town by frequent services of motor-buses, and signs of active trade are apparent at every turn. Important industries have been founded by refugees who owned factories for the same kind of goods in Asia Minor. The Greeks sustained a terrible blow on the sudden arrival of their compatriots, who had been long settled in the Turkish territories, but the country has gained 1,500,000 industrious, active and enterprising inhabitants who, immediately after the first shock was over, recovered their self-control and set energetically to work.

Athens and the Piræus, which had a population of 120,000 and 160,000 respectively in 1912, now form, with Phaleron, an enormous town of one million. During the same period Salonika increased from 200,000 to 400,000. Greece has at present a population of nearly six millions, and, although her people have suffered during the past three years from the

arrival of their emigrant fellow-countrymen, there is no doubt whatever that the country will find in this new element an abundant supply of energy, activity and business aptitude which in the end will make Greece a new nation, fitter for the struggle and ready to take an important place in the world.

IV. Bill of Health.

The question of the bill of health was raised during the tour at various ports — at Algiers by M. Delacroix, shipping agent, who sent a letter to the mission, in which he pointed out the disadvantages (delays and above all the high cost) from which trade suffered as a result of the sanitary and consular visa formalities, and at Genoa by the Secretary of the *General Association of Italian Merchant Marine Doctors*, who submitted suggestions and documents on the question.

Finally, the Algiers Chamber of Commerce forwarded to the President of the Mediterranean Tour a long memorandum on the abolition of the bill of health.

The Health Committee of the League of Nations and the Office international d'hygiène publique have already had before them various resolutions, the most important of which were those submitted by the London *International Shipping Conference* in 1924, and that of the *Congress for the International Assistance of Officers of the Merchant Marine*, which was held in Paris from June 16th to 19th, 1925.

In a number of countries, such as England, the Netherlands, Sweden and Norway, the bill of health is not compulsory, it is only issued to ships which are proceeding to countries in which it is required. On the other hand, Spain is very strict, and vessels which are unprovided with this document are subjected to fines and heavy quarantine charges. The United States not only oblige ships which enter their ports to be in possession of a bill of health from the country of origin, but, in addition, a second special bill of health issued by the American Consul and endorsed by the medical officer of the Consulate. Belgian consuls issue a special certificate to foreign ships proceeding to Belgium.

We shall not refer to the discussions on this question which took place at the Office international d'hygiène publique at Paris, but we think it necessary to state here the facts which we ascertained during our tour, and the arguments put before us in favour of the abolition of the bill of health, or at least a modification of its present form, and the formalities connected with it, such as the various visas, and in particular consular visas.

One of the arguments which is most often put forward against the retention of the bill of health is as follows : The bill of health is a document intended to inform the authorities of a port as to the health situation of the ports from which the vessel comes. With the rapid means of communication now available, such as the telegraph and wireless, there is no reason whatever for retaining the bill of health. A ship sailing from China takes a month or more to reach Europe, and as information can at once be sent by cable as to the existence of cholera or plague in China, the bill of health conveys no fresh particulars.

It has been laid down in sanitary conventions that all the signatory Powers should communicate to the Office international d'hygiène publique at Paris and the other Governments concerned all cases of infectious disease immediately they occur. Public health officials are therefore aware of the epidemic diseases occurring in ports with which their towns have trade relations. It may therefore be asked what use is served by a bill of health which does not provide them with any more official information.

In reply to this, however, it is said that the bill of health is annotated and endorsed by the consuls in the port to which the vessel must proceed, and that these consuls state the position in their area. Does this mean that the information given by the local sanitary authorities is regarded with suspicion ? In that case, what is the use of the Conventions ? What purpose do they serve ?

Again, it may be asked if there is not something irregular and offensive in a health administration, whose duty it is to ascertain outbreaks of epidemic disease and to deal with them, being supervised in this way by the representative of a foreign Power. What precisely is the consul's information ? Either he has been informed direct by the local sanitary service or else he merely repeats popular report and rumour. And everyone knows the degree of reliance that can be placed on information of this kind.

If the consul has been informed by the authorities of the port, he is sure to notify his Government by telegram at the same time as his Government has itself been officially notified through the usual diplomatic channels.

The information thus supplied by consuls is not therefore more reliable than that otherwise received by Governments and is not forwarded more rapidly.

The chief criticism which trading circles bring against these visas is that they cause delay in the sailings of vessels, and also cause much expense.

The consulates and the private houses of consuls are often at a considerable distance from ports and roadsteads. Offices are closed on certain days and at certain hours. It is necessary, therefore, either to wait until they are open (this delays departure by a whole night or a whole day) or else to take the bill of health and have it signed by the consul himself. In the latter case higher fees are charged.

The consular fees differ greatly for the same visa. The following are a few examples for Algiers :

England	104	French francs
Greece	125-160	»
Spain	360	»
Portugal	464-750	»
Turkey	531	»

A ship engaged in the coasting trade which calls at various ports must submit its bill of health for a consular visa at every port, even though these ports are in one and the same country. The Algiers Chamber of Commerce mentioned the case of the steamer *Mont Agel*, belonging to the *Transports Maritimes*, which in 1925 was compelled *in the course of a single voyage to submit its papers for visa on 17 occasions*, the charge being $7.20 on each occasion. This represented an outlay of 3,182.40 French francs ; and this vessel, in addition, was deratted four times *in six months, although it had not touched at any infected or suspected port.* What, then, is the use of international conventions which recommend that deratisation should only be carried out twice a year ?

Italian trade circles and Italian medical officers of public health (and this, too, is the opinion of all French doctors who have served on board ship) believe that the health authorities should be satisfied with the information supplied by telegram. The conditions under which a vessel should be admitted can be decided by verification and enquiry, especially when there is a doctor on board who has been approved by his Government and who makes his declaration on oath.

We consider that the bill of health in its present form might very well be abolished, or at least modified and no particulars required as to the health situation in ports. It would then become merely a sort of passport or identity document for the vessel. The bill of health might instead give information as to the health of the crew and passengers, and the various installations (water, provisions, medical supplies, means of isolation and disinfection, presence or absence of rats, results of deratting, etc.).

We should like it to be a sort of very short health form, which would be filled in by the doctor or by the master in the cases of vessels without a doctor.

In any case the consular visa could very well be abolished, and indeed ought to be abolished. If, however, it must for diplomatic reasons be retained, it should be reduced to a single visa for each country and should not necessarily be required in each port ; in addition, the price should be greatly reduced and should be made uniform.

V. General Considerations and Conclusions.

We cannot conclude our report without drawing attention to a frame of mind which is familiar to all who have some acquaintance with ports and the maritime sanitary services. We refer to the constant and irremovable suspicion which is found between different ports and different countries, and the lack of mutual confidence which is a feature of maritime relations. We cannot do better than reproduce the actual words used by Dr. Raybaud at Geneva during the final meeting :

> "I should like in the first place to enter a friendly protest against a spirit which is prevalent in practically all Mediterranean ports ; when the authorities ascertain the existence of infection in their area, their first thought is to accuse some neighbour of being responsible. The charge is not always brought against a neighbour separated by a political frontier, so that this tendency is not to be attributed to a mistaken nationalism. I would venture to express the hope that a spirit similar to what is known in another and higher sphere as the spirit of Locarno should spring up in the relations between the Mediterranean health authorities of the various ports, irrespective of the flag. They ought to harbour fewer suspicions with regard to the health situation of their neighbours and display less reserve as to incidents which occur in their midst, more *sangfroid*, and a greater moderation in the measures adopted where more or less genuine cases arise which have come to their knowledge by chance, without being verified, and which in reality are often so doubtful or of such small importance that it would be better if they were passed over unnoticed rather than be made the occasion of measures which create an atmosphere of mutual suspicion."

If health measures are to be reduced to their true proportions and if commercial relations are to be rapid and less irksome, the agreements which are to be signed in Paris should be accepted in the most liberal spirit and carried out with complete loyalty.

There must be a spirit of international candour which immediately announces cases of epidemic disease and hides nothing, while the declaration of the authorities should at the same time be accompanied by an accurate statement of the measures which have actually been taken. On the other hand, a vessel should, on the strength of the declaration and the measures in question, be exempted on its arrival in a port from the unnecessary, vexatious and expensive quarantine measures which are now so generally applied.

When it is certain that vessels and persons arriving from a port will not be subjected to measures wholly disproportionate to the actual danger, the authorities of the port in question will have no hesitation whatever in accurately disclosing the health situation ; a feeling of mutual trust which does not at present exist will come into being.

But if the spirit of which we have previously spoken is to be eradicated completely, all ports would in addition have to be organised on hygienic lines and supplied with drinking-water of good quality, and with lavabos and latrines for the use of lightermen and dock labourers. Following the example set in the regulations for New Orleans, Barcelona, Naples, etc., *ports should be rendered rat-proof ;* we mean that the sewers of the port area should not be in communication with the town sewage system, that stores, sheds, offices and all buildings on the quays should be designed and fitted up in such a way as not to harbour rats, that goods and anything which rats could use as food should be placed beyond their reach, and that grain should be kept in silos or on isolated platforms as is the practice in the Far East.

As plague is at present the most dangerous infectious disease in the Mediterranean and Europe, a permanent campaign should be organised and carried out against rats. As obser-

vation and experiment have repeatedly shown, plague in rats tends naturally to diminish and die out ; superinfection as a result either of the appearance of healthy rats which have not yet become immune or of contact with rats infected by another strain and coming from other ports must be prevented at all costs. The public authorities in every country must acquire the conviction that *plague is a rat disease which only attacks human beings in the second place, and that precautionary measures should therefore be taken against rats and not against human beings.*

The announcement that a port is infected with plague should therefore be taken to mean that the rats in the port are infected rather than human beings are infected. In our climate, cases occurring in persons are as a rule not very infectious and, if the patients are isolated, there is no danger to vessels calling at the infected port. The danger is that rats may be conveyed from the port in question along with goods, and these rats may be diseased or, if healthy, they may be germ-carriers, capable of communicating infection.

What is required, accordingly, is constant and effective bacteriological supervision of rat devices to prevent the passage of rats from the vessel to the shore and from the shore to the vessel, and periodical deratisation of ships by processes which are recognised as effective and harmless, but which should be subject to strict control and accepted as adequate by the authorities of all ports. We therefore recommend that experiments should be made, as has already been requested by the Mercantile Marine Congresses, with a view to regulating and *standardising* the fumigation of vessels.

With regard to the movements of population, the measures which we saw in force in Italy, Greece, Palestine and Egypt appear to meet all requirements. The Moslem pilgrimages to the Hedjaz have still to be regulated, and more particularly the return journey of pilgrims by land. We feel confident that the Ottoman Government, which is now represented on the Office international d'hygiène publique, will, without delay, appoint the members of the International Commission for the co-ordination of pilgrimages to the Holy Places.

Should some of the suggestions we have ventured to put forward in this general report and statement of the observations made during our Mediterranean voyage attract the attention of members of the International Sanitary Conference at Paris, the study tour organised by the Health Committee of the League of Nations will have made a further contribution to those already recorded. This would be an encouragement to continue the present system of interchanges of public health personnel.

The Rapporteur again desires on behalf of his colleagues to thank the League of Nations for the facilities it secured for them during their tour.

(*Signed*) L. RAYNAUD.

C.H. 463.

Annex 80.

LETTER ADDRESSED BY THE CHAIRMAN OF THE ADVISORY COMMISSION FOR THE PROTECTION AND WELFARE OF CHILDREN AND YOUNG PEOPLE TO THE PRESIDENT OF THE HEALTH COMMITTEE.

[*Translation.*] Geneva, April 14th, 1926.

I have the honour to inform you that, during its recent session at the seat of the League of Nations at Geneva from March 25th to April 1st, the Child Welfare Committee considered generally the position with regard to several items on the agenda which fell within the joint sphere of action of both the Child Welfare Committee and also of other committees and organisations (such as the Health Committee, the International Labour Office and the International Committee on Intellectual Co-operation). The Committee decided that, to prevent overlapping of work and to ensure full co-operation in the interests of child welfare, it was desirable that a liaison sub-committee should be set up to deal with those matters which affected other committees or organisations jointly with the Child Welfare Committee. It was emphasised that the Liaison Sub-Committee was not to act independently of the Child Welfare Committee, nor to initiate work, but was to prepare and report on such questions as were submitted to it by the full Committee.

The Committee accordingly passed the following resolution :

"The Committee, being of the opinion that certain of the subjects on its agenda are in intimate relation with the questions of health, labour and mental training, decides :

"1. That a Sub-Committee, composed of the representative of the Health Committee, the representative of the International Labour Office and a representative of the Child Welfare Committee, shall be appointed. The Committee invites the Committee on Intellectual Co-operation also to nominate a representative to assist the Sub-Committee in its work.

"2. That this Sub-Committee shall study such questions as are referred to it and shall report to the Child Welfare Committee at its next session."

As soon as the date of the first meeting of the Liaison Sub-Committee has been fixed, I will notify you without delay.

(*Signed*) Pedro SANGRO Y ROS DE OLANO,

Chairman of the Advisory Commission for the Protection and Welfare of Children and Young People.

C.H. 433.

Annex 81.

PUBLIC HEALTH PROBLEMS IN THE FAR EAST AND THE FIRST SESSION OF THE ADVISORY COUNCIL OF THE SINGAPORE BUREAU.

Report by the Medical Director.

The Committee will remember that the Japanese Government requested the Secretary-General, in September last, to invite the President of the Health Committee, and to arrange for the Director of the Health Section, to visit Japan on the occasion of the interchange of the public health officers of the Far Eastern countries. The President and the Vice-Presidents of the Health Committee, to their very great regret, were prevented from accepting this invitation, and I had the privilege of visiting Japan as a guest of the Government. I was accompanied by Dr. H. Kusama, of the Health Section, and Mr. J. B. Wilson, of the Secretary-General's Section, and we were joined in Japan by Dr. Henri Cazeneuve, our Epidemic Commissioner in Russia, who was returning to Europe from Eastern Siberia, where he took part in the Scientific Anti-Plague Mission sent by the Soviet Health Authorities.

1. Having left on October 20th, we arrived in Japan on November 5th. The itinerary of the mission was as follows :

			Depart :	Arrive :
1925 :	October	20th :	Paris.	
		22nd :	Riga.	
		24th :		Moscow.
		24th :	Moscow.	
		31st :		Chita.
	November	1st :	Mandchouli.	
		2nd :		Harbin.
		2nd :	Harbin.	
		3rd :	Changchun.	
		3rd :	Mukden.	
		4th :	Fusan.	
		5th :	Shimoneseki.	
		5th :		Osaka.
		7th :	Osaka.	
		7th :		Kobe.
		7th :	Kobe.	
		7th :		Nara.
		8th :	Nara.	
		8th :		Kyoto.
		10th :	Kyoto.	
		11th :		Tokyo.
		16th :		Nikko.
		18th :	Nikko.	
		18th :		Tokyo.
		26th :	Tokyo.	
		27th :		Miyajima.
		28th :	Miyajima.	
		28th :	Shimoneseki.	
		29th :	Fusan.	
		29th :		Keijo.
		30th :	Keijo.	
	December	1st :		Mukden.
		1st :	Mukden.	
		2nd :		Dairen.
		5th :	Dairen.	
		6th :	Tientsin	
		6th :		Peking.
		10th :	Peking.	
		10th :		At the Field H.Q. of the 1st Kuominchun.
		12th :	From the Field H.Q. of the 1st Kuominchun.	
		12th :		Peking.
		14th :	Peking.	
		16th :		Hankow.
		19th :	Nanking.	
		20th :		Shanghai.
		22nd :	Shanghai on s.s. *Kashgar*.	
		30th :		Singapore.
1926 :	January	8th :	Singapore on s.s. *Insulinde*.	
		14th :	Colombo.	
		24th :	The Suez. Canal.	
		29th :		Marseilles.

2. I have given a brief account of the Japanese interchange in my general report to the Health Committee. I wish to emphasise here the most generous hospitality extended by the Government. by the provincial and communal authorities and by the medical associations to our interchange officers. I feel sure the Committee would wish to ask their Japanese colleagues to present to all concerned the expression of their very real gratitude both for the hospitality shown and for the very careful organisation of the interchange.

The organisers felt that their foreign visitors would have to learn a great deal about the life of the people of the country visited in order to understand the basis of the public health system of Japan and to make useful comparisons with the experience gained in their own country. For this reason, the programme differed somewhat from the plan adopted in the other countries, and, particularly in the early stages, the visits to institutions other than sanitary institutions and informal social meetings occupied as much, or perhaps even a little more, time than the study of the health services. This was indispensable and all the interchange officers feel they owe a real debt of gratitude for the unusual opportunity given for the study of the general conditions of Japan.

3. The technical study was greatly facilitated by the publication of the "Handbook on the Health Organisation in Japan". The information therein contained was supplemented by information prepared in every place visited and freely distributed during the tour. I should like to draw the Committee's particular attention to the great amount of labour involved in the preparation of the English text of the very full local reports, and also to the considerable expense incurred by the central and local authorities for all the arrangements made.

The Chief Medical Officer of the Central Sanitary Administration accompanied the interchange officers and subsequently ourselves throughout our stay in Japan proper. The three interchange groups were each in charge of a senior medical officer of the Central Administration and the members of the Committee will perhaps realise what difficulties had to be overcome if they picture themselves asked to provide in their own countries competent medical officers speaking fluent Japanese to accompany a group of Japanese colleagues visiting their countries.

I think we all felt greatly handicapped by our ignorance of the Japanese language, in spite of the fact that the fullest information in writing was given on any point which members of the group wished to raise. We were particularly impressed by the very considerable wealth of technical information that is only available in Japanese and which contains the accumulated experience of the Japanese Public Health and Medical Service. This experience is not only of recent date. Japan is fortunate in having built up during two or three centuries the foundations of a well-planned sanitary legislation and administration, in the form of an unusually complete system of vital statistics. Every communal authority throughout Japan, including the rural districts, has kept for some two hundred years family registers, details of which will be found in Appendix I. Since the introduction of the modern administration after the Meji restoration in 1868, the police-stations have kept a household register which represents a permanent census of the entire population of Japan. The cards for each resident contain sometimes observations which enliven the information and make of them a truly human record. The resident's occupation, change of name and position and the vicissitudes of life of almost every Japanese citizen can be followed throughout his lifetime by the study of the two registers.

In addition, a complete vaccination register is kept in the district offices throughout the country. I have annexed some parts of this register (see Appendix III), as well as extracts from the vaccination law and a summary of the vaccination practice. In districts where anti-typhoid vaccination is carried out, a special register is kept for the purpose.

The records of vital statistics are centralised in the Central Statistical Bureau in Tokio. This office is in the hands of a fully competent staff of modern statisticians in the prime of their life, who have acquired the knowledge of modern practice and theory mainly from the American schools of vital statistics.

A school of vital statistics is attached to the Central Bureau, whose staff gives three months' systematic courses for university graduates, candidates for the provincial and communal statistical bureaux. I was glad to note that the statistical work of the Health Organisation is known and followed with great interest by the technical officers of this service.

4. The present-day system of sanitary administration is modelled on the German practice. The Central Sanitary Bureau is attached to the Ministry of the Interior and its directorship is reserved for civil servants of the "Chokunin" rank. The Japanese Civil Service is divided into the following categories :

Higher Rank.	1st Class, Shinnin :		Direct Imperial Appointment
	2nd Class, Chokunin :	1st Rank 2nd "	Imperial Appointment.
	3rd Class, Sonin :	3rd Rank 4th " 5th " 6th " 7th " 8th "	Appointment made with the Emperor's approval.
Lower Rank.	4th Class, Hannin :		Appointment at the discretion of the chief official.

The health officers have to start their service in the Hannin Class unless they can produce evidence of scientific work or laboratory experience, when they are placed at the start in the Sonin Class; the initial stage lasts two years. The district medical officers are usually in the 4th or 5th rank of the Sonin Class.

The present head of the Health Service is a distinguished lawyer and administrator. The Chief Medical Officer of the Central Bureau and his colleagues are, in fact, technical experts of the service whose executive officers are not medical men.

The Provincial State Service follows the same lines. I can do no better than reproduce (Appendix II) scheme of a provincial health organisation, namely, that of the Saitama Prefecture :

Saitama Prefecture.

		Saitama Prefecture	Japan
Area, square kilometers		3,803.54	387,916.04
Number of households		237,943	11,222,053
Population . . .	m. 641,174 f. 678,359	1,319,533	55,963,053
Population per household		5.55	4.99
Population per sq. kilometer. . .		347	144

There is no city in this prefecture but only towns of less than 30,000 inhabitants of which Urawa, Omiya, Kawagoe and Kumagaya are the largest.

The great majority of the population is engaged in agriculture, and the industries have not yet greatly developed except for a few weaving factories in certain smaller towns.

The prefecture is an administrative unit corresponding to the French *département* or an English county. It is in charge of a governor, there being 47 prefectures in Japan. It should be noted that public health is under the Police Department of the prefecture.

The Director of the Sanitary Section of the Police Department corresponds to a county medical officer of health or to a departmental inspector of health, but here again he is acting as an expert, the executive officer being the Commissioner of Police. In the Saitama Prefecture, for a population of 1,319,533, there are 10 assistant medical officers of health, 3 pharmacists, 10 veterinary surgeons and 32 other sanitary employees. One or two medical officers, specialists in industrial hygiene, act as experts for the Factory Section of the Police Department.

In each town and the larger rural districts there is a police-station, divided up into sub-stations and police posts, and these in turn send out single policemen, who are on permanent duty in each village. The police organisation, *i.e.*, its health experts, are responsible for the prevention of infectious disease, for the control of food and drugs, for the registration and supervision of medical practitioners and pharmacists. The municipal and communal health authorities are responsible for the establishment and maintenance of hospitals for infectious diseases, for isolation houses, for smallpox vaccination, for the treatment of trachoma, for the maintenance of lunatic asylums, for the water supply and sewage disposal, for the disposal of refuse and garbage. The local government officials are under the supervision of the Department of the Interior of the prefecture for their general work, but their health services are under the supervision and control of the Sanitary Section of the Police Department, save for school hygiene, the school medical inspector being attached to the Education Section of the Department of the Interior.

In smaller towns, the State medical officers perform the duties of the municipal health service.

The ten assistant medical officers are divided as follows regarding their specialist function :

The Staff of the Sanitary Section of the Prefecture.

(Chief Medical Officer)

Miscellaneous work : 1 police inspector, 1 assistant police inspector, 4 police sergeants, 2 policemen and 6 employees.

Prevention of infectious diseases : 1 assistant medical officer, 4 clerks.

Bacteriological examination : 2 bacteriologists, 2 clerks.

Prevention of venereal diseases : 1 physician.

Prostitute hospitals : 1 physician, 1 clerk.

Mental diseases : 1 physician.

Public health investigation : 1 medical investigator (part time), 2 clerks.

Hookworm and other parasites : 2 assistant medical officers (part time), 4 clerks,

Temporary research work on nightsoil disposal : 3 bacteriologists and chemists. 6 clerks.

Inspection of drugs : 2 pharmacists of whom one acts as a travelling inspector.

Inspection of foods and drinks : 1 pharmacist (full time), 2 pharmacists (part time).

Inspection of slaughter-houses : 7 veterinary surgeons (part time).

Control of milk and meat : 8 veterinary surgeons (part time).

Hydrophobia and cattle diseases : 2 veterinary surgeons (full time), 1 veterinary surgeon (part time).

The Prefectural Council, under the chairmanship of the Governor, votes the health budget. The budget of a prefecture is made up of two parts : (*a*) a general grant-in-aid from the State exchequer ; and (*b*) the taxation collected locally. The figures for the Saitama Prefecture for 1924, 1925 and 1926 indicate the proportion of the two items, the expenditure being divided into ordinary recurrent expenditure and temporary.

The *ordinary expenditure* is as follows :

Health :	1924	£6,462	(£228 State grant-in-aid)
	1925	£7,354	(£226 ,, ,,)
	1926	£6,075	(State grant-in-aid not yet decided)
General :	1924	£497,847	(£46,724 State grant-in-aid)
	1925	£494,974	(£38,667 ,, ,,)

Temporary expenditure :

Health :	1924	£8,530	(£1,612 State grant-in-aid)
	1925	£5,075	(£3,706 ,, ,,)
	1926	£8,815	(No State grant yet decided).

The estimates for the public health services for 1926 give details of the proposed expenditure :

Budget Estimates for the Public Health Services for 1926.

I. *Ordinary recurrent expenditure*		£6,075
1. Sanitation (salaries of medical officer of health and employees appointed by Governor of the prefecture, travelling expenses, sanitary examinations, etc.		1,942
2. Prevention of acute infectious diseases.		543
3. Prevention and treatment of hookworm		521
4. Prevention of trachoma		153
5. Prevention of tuberculosis		296
6. Prevention of leprosy		1,254
7. Investigations in public health		448
8. Subvention for improvement of physique		150
9. Nursing of infants (new item)		300
10. Physical examination and treatment		466
II. *Temporary expenditure*		£8,815
1. Grant-in-aid for the public health budget of city, town and village		5,695
A. Prevention of acute infectious diseases	£5,380	
B. Prevention of trachoma	115	
C. Prevention of hookworm	200	
2. Subvention to the Physicians' Society		80
3. Grant-in-aid for waterworks		2,000
4. Isolation of insane persons		1,040

5. I had many opportunities of visiting the various types of sanitary institutions, both State and municipal. The hospitals and sanatoria are as densely populated as the country itself. The hospitals, whether located in quite modest wooden barracks or in imposing up-to-date brick buildings, are under the direction of a very large medical staff. This is indeed one of the first impressions obtained from any of the medical institutions. The average general hospital of 150 beds has a staff of 20 medical officers and 50 nurses. The Medical Research Institutes, like the Government Institute for Infectious Diseases, have a medical staff composed of 61 full-time technical workers and 37 voluntary workers. The Institute of Hygiene of the Central Sanitary Bureau has a staff of 63 permanent technicians and 35 associates. The medical staff is almost exclusively composed of men ; I do not believe that we met more than three or four medical women on the medical or sanitary staff in the institutions visited.

The medical profession is indeed numerous ; there are 43,028 registered medical men, and each year 1,500 medical students graduate at 18 medical faculties and medical schools. There are two special medical schools for girls, and the total number of registered medical women is 499, while there are rather less than 100 graduates every year.

The hospitals are exceptionally well provided with laboratories both for research and routine. The influence of German teaching is much in evidence in the hospitals. The case cards are printed half in Japanese and half in German and the equipment of laboratories is very reminiscent of Central Europe.

6. There is also evidence of deeper influence of the Central European school of medical thought. The technical experts of the Sanitary Administration are rather medical advisers than practitioners of public health and preventive medicine. They are admirably brought up on the principles and practice of modern medicine. They are exceptionally well read, diligent, industrious and imbued with a spirit of self-sacrifice. It need only be said that

a large proportion of the medical staff at the sanitary institutions is unpaid, while the whole-timers serve for very small salaries, even on the Continental scale. The outlook of the profession is certainly more medical than preventive. It is true that bacteriology is greatly developed, and serological and immunological research abounds. The appreciation of the social character of preventive measures is of a recent date and will no doubt be greatly developed in the near future. For example, the measures against tuberculosis are mainly centred on the system of sanatorium and there are hardly any dispensaries. I think I am right in saying that no venereal disease dispensaries have yet been estab lished in the country. Child welfare and maternity centres have of late been set up at various places in the country but in the aggregate do not exceed some 120.

The standard of the technical work — medical, laboratory and public health — is very high indeed. No provision has so far been made for systematic training of sanitarians and as yet there is no legal enactment requiring a diploma in public health for candidates for the sanitary services.

The tendency towards the development of social and preventive medicine will be considerably strengthened when the National Health Insurance Act comes into force early in 1927. Active arrangements are now being made to prepare a plan for the working of the health insurance, which it was originally proposed should be administered apart from the sanitary services of the country. It is not improbable that a plan of closer co-operation between the two services will be worked out in the course of the year.

7. The existing sanitary legislation appears to have endowed the State with sufficient powers to put into practice any requisite measures for the protection of public health. The measures proposed by the authorities are as a rule willingly accepted by a well-instructed population, which is perhaps more ready to conform with governmental regulations than in many other countries. The health propaganda is rendered easy in a country where 96 per cent of all boys and about 90 per cent of all girls obtain elementary education and where a very considerable proportion receive in addition secondary education.

The Japanese Health Service utilises to the full all these opportunities. Brought up in the traditions of the epoch of bacteriological discoveries, it first concentrated its efforts on the attack against infectious disease.

Fortunately, typhus fever is as unknown in Japan as it is in England ; this is due to the exceptional cleanliness of the people as a whole. I doubt whether there is any other example of a universal observance of a national custom prescribing a daily hot bath. Those who cannot indulge every day in this luxury go to the public baths at least three times a week.

Nevertheless, intestinal disease continues to represent one of the most difficult public health problems. Parasitic infection certainly appears to be due in part to the national diet, which consists mainly of raw fish and raw vegetables of all kinds. Typhoid infection probably comes from the same source, while the carrier factor plays an important rôle. The exigencies of the economic situation have made it difficult until recently to introduce radical measures for the disposal of nightsoil and sewage. Every available square foot of land is under intense cultivation and every ounce of manure is fully utilised. This has produced, on the one hand, a difficult problem of sanitary engineering and, on the other, abundant opportunities for infection of food that is eaten uncooked. Dysentery, which in recent years is becoming less toxic, is spread in the same way, and the prevalence of parasitic disease has an endemic character.

Cholera invades Japanese ports almost every summer, coming from Chinese ports and particularly from Shanghai by way of the inland sea. It is kept under strict control and character.

The attack on the intestinal disease was led by the magnificent research institutions. The Kitasato Institute of Preventive Medicine, under the distinguished direction of Professors Kitasato, Kitashima, Miyajima and Hata and others, and the Government Institute of Infectious Disease, most ably conducted by Professor Nagayo, with the devoted assistance of Professors Miajagava, Futaki, Ishigara, Takaki and others, rival each other in their successes in discovering, describing and studying in detail the ætiology of parasitic infection, in surveying and conducting intensive research into problems relating to typhoid and dysentery immunity. Field stations are established, field surveys covering hundreds of thousands of people are made and, lately, field laboratories have been set up to solve the all-important problem of sewage disposal and the disposal of nightsoil for individual dwellings and rural communities. A systematic experimental research was started some two years ago into the spread of cholera by the contamination of food, particularly fish ; its results should be of considerable international importance. I am indicating only the general lines of the research work that is carried on in the numerous State hygienic laboratories, universities and special institutions.

The State Health Service, while utilising to the full the results of the scientific investigations, bases its administrative measures on carefully planned and meticulously executed surveys. Preventive inoculation against typhoid has of late been advocated, and put into practice in certain endemic areas. Incessant efforts are made to improve water supplies and to set up sewage-disposal plants in urban centres. Grants-in-aid are freely used to hasten this development.

In spite of all these efforts, the incidence of typhoid fever, its death rate and the case mortality continue very high. An explanation of all the doubtful points seems still to be lacking. It is widely assumed that a large proportion of the population acquires a relative resistance consequent upon mild infection at an early age. This makes all the more interesting the problem of immunity caused by the continued prevalence of enteric fever.

The problem of tuberculosis is no less difficult. The death rate seems to be particularly high among women, and this, perhaps, can be explained by the social customs of older Japan, which made the life of the women much more sedentary and confined to home occupations than that of men. The picturesque and old-fashioned dress is also a factor, and there is a remarkable difference in the physical development of the younger generation of Japanese girls, who benefit by the new practice of physical culture in the elementary schools. The Central Administration is fully alive to the considerable work that lies before it in intensifying the anti-tuberculosis campaign and it is planning it on modern lines.

The relationship between the diet of the people and the problems of public health suggests itself constantly. Cow's milk is seldom used for the feeding of infants. This may be a factor in the problem of tuberculosis and it certainly cannot be disregarded as one of the reasons for the high infantile mortality in Japan. The care bestowed by the Japanese on their children is truly astounding : there is almost a cult of the child. This attachment to the rising generation will certainly help the Japanese Health Service to conduct its work on child welfare and maternity along modern lines, based on the use of welfare centres. The social structure of Japanese society and the strong attachment to the family as its unit has probably prevented the rapid development of this movement, the average family being generally reluctant either to present its children for examination at a public institution or, in case of need, to submit its infants to care and treatment in an institute.

The social system of Japan also probably accounts for the fact that measures to prevent venereal diseases are limited exclusively to prostitutes. There does not appear to exist a single centre for free treatment for men. While the control of registered prostitutes seems to be very complete and the medical examination as thorough as any such system can be [1], there are very prominent leaders of public health in Japan who seem to be satisfied that venereal diseases can be kept in check when the entire male population is left to the care of the private medical practitioner.

8. I have called attention to those parts of public health work which are now being rapidly developed because co-operation between ourselves and our Japanese colleagues capable of producing useful results can be arranged without delay in this field. I have done so also because the whole of the medical and sanitary work which it was our privilege to study in Japan is of such a high standard that to insist continuously on its efficiency would be out of place. Take, for instance, the Quarantine Service, fully dealt with in Dr. Norman White's report on port health procedure in the Far East. According to the unanimous testimony of representatives of the sanitary administration in that part of the world, the Japanese and the Dutch quarantine services are model organisations. Quarantine for Japan is a grim necessity. A country whose people as a whole are as clean as those of any other nation of the world, and whose medical health standards are certainly at least equal to those of any great European Power, is surrounded by endemic foci of cholera and plague. Its distance from the nearest focus of cholera is only thirty hours by sea and its economic life depends on sea-borne trade. Having before their eyes the example of the introduction of plague into the Dutch East Indies several years ago, and having to reckon with the century-old custom of eating uncooked food, the Japanese quarantine officers have to exercise a real control and have to be very strict with the shipping community in periods of epidemics. The quarantine regulations of Japan are liberal, but they are applied as a rule in accordance both with the spirit and the letter of the text. It is natural that the Japanese quarantine service should take an active interest in international co-operation in matters of maritime health. It looks with apprehension on the lack of sanitary organisation in Chinese ports, even in wealthy Treaty ports. It insists very rightly on the necessity of recognising in the international sanitary conventions the status of Japan as a Great Power, but it is certainly willing to accept any international measures which the other Great Powers would accept as applicable to themselves. The new draft of the clauses relative to the Far East prepared by the October session of the Office international d'hygiène publique appears to satisfy its special claim in regard to cholera and plague in its part of the world.

9. I found a genuine interest in the work of the Health Committee not only among the leaders and the rank and file of the Public Health Service but also among the medical profession as a whole. The manifold activities of the Health Organisation are followed closely by specialists, who take an interest in the work of certain commissions or who are willing and anxious to take part in certain special studies and enquiries. For example, the newly appointed Smallpox Commission has induced a very real desire to co-operate. The racial aspects of the cancer studies, the enquiries regarding malaria, the proposed study of leprosy, the work of our Statistical Committee, the studies made by the Commission on Public Health Training, the study of the Tuberculosis Commission — not to speak of the serological and biological researches — have all found an echo in the minds of very prominent specialists, who wish to associate their own work with that of the several commissions of the Health Committee. Our Japanese colleagues took the view that the League's health work is so important and of such a varied nature, and that there are so many of the leading medical and public health workers in Japan who are willing to offer their assistance that they decided to set up a Co-ordination Committee to follow our work, to ensure permanent co-operation and assist the

[1] There were 162 hospitals with 4,992 beds for prostitutes in 1923. They had 58,281 in-patients, with an aggregate of days of treatment reaching the figure of 1,051,735.

Japanese member of the Health Committee in his work. The committee is composed of the chief medical adviser of the Central Sanitary Bureau and of his senior assistant, of two representatives of the Kitasato Institute, of two representatives of the Government Institute for Infectious Diseases, and of the Director of the Government Nutrition Institute, and it is presided over by our friend and your former colleague Professor Miyajima. I need not say that all our official correspondence with the Japanese Sanitary Administration will always be addressed to the Director of the Central Sanitary Bureau of the Ministry of the Interior, who will continue as the official channel of communication.

I have discussed with this Committee the plan of co-operation. I have stated enough in my impressions to show how valuable it would be for the Western public health services and medical research workers to benefit from the experience accumulated in Japan, and how valuable it would be for both sides to bridge over the distance that separates the two centres of intense activity. The distance is measured not only by space but also by the linguistic difficulties, by the profound differences in the environment in which similar problems are treated and finally by differences in the manner of thought.

We felt that a problem so complex would have to be attacked in several ways. It was therefore decided to propose to the Health Committee :

(1). That monographs based on recent original Japanese research work on public health problems of international importance would be presented to, and published by, the Health Committee. A monograph on experimental work on cholera by Dr. Takano, the chief of the Section of Infectious Diseases of the Central Sanitary Bureau, and another on problems of nutrition by Professor Saiki, the Director of the State Nutrition Institute, are being prepared and will be shortly sent to Geneva.

(2). That corresponding members be invited to take part in the work of the several commissions and committees of the Health Organisation. The following names are suggested :

Public Health Instruction.	Dr. Miyajima, Kitasato Institute.
Cancer.	Dr. Nagayo, Imperial Institute of Infectious Diseases.
Encephalitis lethargica.	Dr. Takouchi, Health Institute of the Imperial University of Tokyo.
Leprosy.	Dr. Shiga, Medical School of the Imperial University of Chosen.
Malaria.	Dr. Koizumi, Kitasato Institute.
Smallpox.	Dr. Kii, Imperial Institute of Infectious Diseases.
Vital Statistics.	Mr. Goto, Imperial Statistical Bureau.

3. That four individual fellowships be given to Western public health and medical research workers who would go to Japan to study at a Japanese institution for a period of some nine months. The following institutions have stated their willingness to receive foreign workers :

1. The Government Institute for Infectious Diseases.
   Helminthological research worker, under the direction of Dr. Y. Miajagava.
2. The Kitasato Institute.
   Parasitological research worker, under the direction of Dr. M. Miyajima and Dr. M. Koizumi.
3. The Tohoku Imperial University (Sendai).
   Bacteriological research worker, under the direction of Prof. K. Aoki.
4. The Government Nutrition Institute.
   Research worker in nutrition problems, under the direction of Dr. Takahira (in the absence of Dr. Saiki, visiting Europe for exchange professorship.)

(4). That, in exchange, four Japanese public health and research workers should be given facilities for studying Western problems of special importance to Japan.

The following subjects are suggested :

The study of, and research regarding, problems of photo-nutrition ;
The study of oral vaccination ;
The study of the prevention of venereal disease ;
The study of the preventive and medical aspects of health insurance.

(5). That, if possible, a Japanese professor be invited to lecture at two or three centres in the West on Japanese scientific experience in public health problems in a consecutive course of university lectures. The Committee will be particularly glad to learn that Professor T. Saiki is prepared to come to Europe for this purpose.

10. The Committee, I am sure, will welcome the plan of co-operation suggested by the Co-ordination Committee. I am particularly glad that the Director of the Central Sanitary Service, Dr. Yamada, the distinguished administrator whose help, support and advice proved invaluable in ensuring the success of the interchange, was one of the sponsors of the scheme of closer co-operation between the Japanese Public Health Service and the League. I should like to record here my very real appreciation of his unfailing kindness and great interest taken in every phase of our work.

Dr. Uchino, the Chief Medical Officer of the Ministry, was of course fully conversant with our work as he had been one of your former colleagues. His enthusiasm and his desire to give us as much insight as possible into Japanese life as a background for the study of public health made him an interesting companion, always ready to give the fullest and clearest information on every public health problem.

11. We parted with Dr. Uchino on leaving for Korea, where we spent a most instructive day with Professor Shiga, who is the Chief Medical Adviser to the Governor-General of the colony, and with his distinguished assistants. The scheme of sanitary administration of the colony has been well described both in Dr. Norman White's Report and in the handbook on the Public Health Organisation of Japan. We had unfortunately no time to do more than visit the research and educational centre established by Professor Shiga at Keijo (Seoul), the capital of Chosen (Korea). Professor Shiga's Medical Research Institute was set up as an advisory organ to the health administration for the solution of many pressing practical public health and medical problems. The local epidemiology of typhoid fever, dysentery, malaria and of parasitic disease is investigated by a staff of zealous and most competent young workers. A systematic study is made of the dietary of the native population. The native pharmaceutics are experimentally investigated. Studies of social medicine and eugenics are made. The country has been surveyed, and the enquiries are continuous into the native methods of medical treatment and midwifery, and reform schemes are worked out. I am merely giving indications of the type of work being done at the same time as the scientific research, for which the great authority of Professor Shiga ensures a high standard of practical value. Professor Shiga is continuing his studies, undertaken on behalf of the Health Committee, as to the best method of the standardisation of dysentery serum.

The Committee will be glad to learn that he agreed to start a large field enquiry into the value of intestinal vaccination against dysentery. He is utilising the winter months for working out a practical method for the preparation of the dysentery antigen in large quantities, and this summer will begin the field study. Chosen represents a very favourable area for such an experiment. The Public Health Service is in the hands of over 250 young Japanese medical officers, well trained, belonging to a central and unitarian organisation and placed under the supervision of Professor Shiga's research centre at the capital. A strict record of all the vaccinated will certainly be kept, for they are residents in an endemic area of dysentery. The observations will be analysed scientifically, and checked in a laboratory, so that the final results will be based on clearly ascertained facts. Professor Shiga is very anxious that the plan for the field experiment should be discussed with the directors of similar studies at other centres so that the results obtained can be compared. The resolutions of the Advisory Council of our Singapore Bureau, to which I will refer presently, give him satisfaction on this point.

12. When we left Korea for Manchuria and the Leased Territory of Kwantung, we came outside the districts under Japanese sovereignty, but we were all the time in the zone of Japanese administration. The Central Service of the South Manchurian Railway Company represents the executive organ in public health of this administration. We were still on familiar ground, which indeed we never left from the day of our landing in Japan.

It is difficult for anyone who has not visited the zone of this railway to realise how model, complete, up to date and, in some details, luxurious is the Sanitary Service financed entirely by the railway company. A great Japanese statesman, Viscount Goto, one of the early pupils and assistants of Robert Koch, former Director of the Central Sanitary Bureau, former Minister of Foreign Affairs, Governor of Formosa, was responsible for the system of registration of opium-smokers, and, as a first President of the South Manchurian Railway Company, he decided to make a demonstration of the civilising value of medicine and public health. This demonstration was very complete. The company has set up and maintains three schools of medicine, numerous bacteriological laboratories, with a central institute of hygiene and a serum, vaccine and lymph-producing department. It conducts an anti-tuberculosis campaign on absolutely modern lines. It has established child welfare and maternity centres, with a large staff of well-trained and very active visiting nurses; this constitutes a notable advance on Japan proper, where the system of public health nursing is still in its infancy. Its hospitals are of the best Western type, and the new hospital at Dairen, built by American architects, seemed to the interchange officers and to myself to be the most up-to-date, luxurious and comfortable that we had seen anywhere.

The anti-epidemic service of the company is a true safeguard against the passing of any plague infection through the barrier which has been established further north in Manchuria by the Chinese Anti-Plague Service. It is extremely well equipped, well staffed and ready to act absolutely at a moment's notice. Dr. Tsurumi, who left the post of Chief Medical Officer of the company to join in our work, has every reason to be proud of the exceptional service which he conducted with such distinction, energy and ability. It is a source of great satisfaction to me that his successor, Dr. Kanai, was the first Japanese member of the Health Section, and he is even keener, if that were possible, than Dr. Tsurumi for the closest co-operation with the League's Health Organisation. The company places at the disposal of its Chief Medical Officer a sum of one million yen (£100,000) as an anti-epidemic fund on which he can draw in case of emergency. The fund is made up to strength after each epidemic, and it stood at the figure of one million during our visit, in spite of the fact that in the summer months a sum of £3,000 had to be spent on emergency measures required owing to the spread of cholera from Shanghai. The sanitary services of the company are

very eager to establish the closest possible link with our Singapore Bureau, and should, unfortunately, any larger epidemic occur in the railway zone, they would like to invite a representative of the Bureau to study, advise and report. They are prepared to co-operate financially out of the million-yen fund in any international study or research into pneumonic plague, in which they are, for obvious reasons, deeply interested.

13. *China.*

(1). — The Kwantung Leased Territory has a Public Health Service of its own in the small area under its jurisdiction, which contains two ports, Port Arthur and Port Dairen. Dairen is the headquarters of the South Manchurian Railway Company and of many of its central institutions, but the quarantine station at Dairen is under the Kwantung Government. Modern as the quarantine stations are in Japan proper, the establishments at Dairen are truly palatial. And yet Japan is ready to hand over this station, more commodiously and luxuriously organised, and as efficiently run as any owned by any other Great Power, to a Chinese National Quarantine Service as soon as such a service is set up and gives guarantees of efficiency.

(2). Incredible as it sounds, China, with her fifty-odd Treaty ports and her 5,000 miles of sea-coast, has no Quarantine Service. Still less credible, the arrangements made by flourishing International Settlements are often inadequate, although Europeans and Americans are almost exclusively entrusted with the functions of port health officers, who are selected from among local practitioners, sometimes with no special knowledge of public health in general and of port health work in particular.

A truly peculiar legal situation complicates the problem. Quarantine implies three operations : (*i*) movements of ships in harbours ; (*ii*) isolation of cases and contacts on shore, etc. ; (*iii*) the issuing and the enforcement of quarantine regulations. In China, all movements in harbours fall within the sole competence of the Chinese Maritime Customs, a service of, but in fact not under, the Chinese Government ; all operations on shore are within the exclusive competence of the Chinese territorial authorities, except, however, in the International Settlements, while, in virtue of existing treaties, no regulations can be enforced against vessels flying foreign flags without the consent of their respective consuls.

A situation so anomalous required clearing up. The foreign, mainly British, Chambers of Commerce in China demanded a codification of regulations, first of all at Shanghai, and the consent of the consular body was obtained by the Customs Service at Shanghai, and subsequently at several other Treaty ports, for sets of quarantine regulations, to which foreign vessels are now bound to conform. But these regulations still differ widely in scope, and continue to be administered by foreign part-timers who havé no relations with the national territorial authorities or each other in the different ports, which are in many cases deficient in sanitary equipment and organisation.

The Chinese health authorities have, for some time past, considered the advisability of arranging for a survey of the Chinese ports by an independent expert body, and there is a desire to apply to the Health Committee of the League for the purpose.

(3). The Peking Government gave us an official welcome, placed technical officers at our disposal, made our stay as profitable and as pleasant as possible, and offered us free passes on the railways, etc. The Minister of the Interior gave me the draft of an official request to the Secretary-General of the League for the survey, which he was sending to the Foreign Office for despatch to Geneva at the opportune moment.

It is obvious to me that the setting up of a complete system will be a difficult task, to be undertaken after the survey has disclosed a catalogue of obstacles to be overcome. The scheme is to me, however, worth a great effort on our part, as it would be of immense significance for raising China out of primitive sanitary chaos by the setting up of a centre of conscious effort ; moreover, it would be of very considerable importance for the world's shipping and sanitary maritime defence.

(4). Modern medicine in China is practically non-existent. The most optimistic estimates of the number of medical practitioners of Western education, either abroad or in China, vary between 2,500 and 10,000. The majority reside in big cities and a large proportion are considerably under a low European or Japanese standard. The annual output does not exceed a few hundred. Medical institutions are very few outside the large towns. Four hundred million Chinese are therefore left almost exclusively to the care of the Chinese practitioners who base their skill on the tiger-hair cure. (That mortality in China is not still higher is a melancholy reflection on the effectiveness of modern medicine.)

And yet the modern sanitary institutions exclusively staffed by Chinese which I visited struck me as very efficiently administered, and the competence of the personnel was certainly of the Japanese standard. The Chinese masses, who, some fifteen years ago, were prone to revolt against plague measures, apply now in thousands for anti-cholera vaccinations in times of epidemics. They appear to accept readily modern measures when usefulness is practically demonstrated, particularly by their own people or by foreign doctors living in their midst. As individual therapeutics are out of the question, there is a vast field open for preventive medicine.

The Russians, faced with a somewhat analogous problem some seventy years ago, established a county medical service on a larger scale even than the Indian Medical Service. It is obvious that some vast system of public preventive medicine must be established, that it must be based on national effort, but that, to succeed, it must be assisted from abroad. Its success is bound up intimately with the control of one of the two most extensive areas of epidemics in the world. It is also closely connected with the progress of the mass education movement acti vely promoted by a vast association of teachers, administrators and provincial leaders. Any assistance given to the health reformers will ultimately lead to co-operation with the educationists.

(5). When the United States of America, with territories as varied in sanitary standards as England and Turkey, set about establishing and consolidating their modern public health system, a Marine Hospital Service was created as a rallying point of co-ordinated central effort. It has now become the Federal Public Health Service, the most extensive sanitary organisation in the world. The Chinese desire to copy the American precedent and, indeed, a crystallising centre is indispensable, and no better could be found than the sanitary institutions at the ports on which the prosperity of the country depends. There is now a proposal put to Great Britain to utilise one-quarter of the Boxer Indemnity, which by Act of Parliament is to be returned to China, for a comprehensive scheme of public health development at provincial centres, and the successful operation of any such scheme would depend on the existence of a Chinese Sanitary Service.

The Ministry of the Interior, in proof of its earnestness in the matter, appointed a special quarantine committee for the study of the problem. I told the Chief Health Officer that I should be prepared to recommend to the Health Committee the award of two quarantine study scholarships as soon as the survey was completed, and that a Chinese medical officer would be considered for temporary service in the Health Section.

14. *The Singapore Conference, January 4th to 7th, 1926.*

The scope of work and the estimates of the Singapore Epidemiological Bureau were drawn up last February by a Conference convened by the Council and attended by delegates from the Straits Settlements, the Federated Malay States, Siam, India, Indo-China, Ceylon, the Dutch East Indies, Hong-Kong, Japan, the Philippine Islands, China and British North Borneo. The Conference proposed, *inter alia*, the setting up of an Advisory Board, which, by Council resolution on the Health Committee's recommendation, was to consist of members nominated by the administrations invited to the February Conference. Ceylon declined but Australia accepted the invitation. The first session sat from January 4th to 6th to determine the work of the Bureau, to consider its financial future and recommend estimates for 1926, and to discuss its further technical utilisation. The same delegates attended last year — except for Australia, which took the place of Ceylon ; the British Sanitary Adviser, who sat for Siam instead of Prince Sakol ; and China, which was represented by the Head of the Plague Prevention Service and not by the Singapore Consul. Dr. Heiser, Director for the Far East of the International Health Board of the Rockefeller Foundation, attended as observer.

All the administrations represented and, as I ascertained on my return journey, also Ceylon and the Sanitary, Maritime and Quarantine Service of Egypt found that the Bureau was rendering them valuable services. The essential task of the Bureau is to collect by cable information on the prevalence of epidemic diseases at ports in an area extending from Vladivostock and Japan to Cape Town and Port Said, and including Australia ; also to obtain intelligence on the movements of "infected" ships, to classify the information and re-telegraph itin special code in the form of weekly bulletins, confirmed subsequently by mail by a somewhat more extended, printed "Fasciculus". There are one hundred important ports in the area, divided into four groups, each receiving special telegraphic information. The zealous director of the Bureau issued in April last the first bulletin, with information on four or six ports ; at present he deals with seventy odd, and will reach the hundred-port mark in a month or two. The bulletins are broadcasted every Friday, free of charge, by the French station at Saigon, and repeated the same day by the Bombay station for the benefit of the Indian ports and ships at sea. Since January 24th, the Dutch station at Bandoeng (Malabar) has re-broadcasted the Saigon message on Saturdays, and the possibilities of repeating it again from St. Assise, Rugby and Nauen will be considered. The air in the Far East seems to be capricious, full of electric disturbances preventing the normal picking up of messages, which is complicated by commercial and other rivalry. Hitherto, wireless has been confirmed by cables, for the transmission of which we failed to obtain Government rates, much to the surprise of the Governments in the Far East, which expected more of the prestige of the League. As the cables for 1926 would have cost about 80,000 gold francs, the Board, partly on my advice, decided to offer free wireless bulletins in exchange for the weekly returns from ports, and will confirm by cable only on request and at the demander's expense, recommending the use of prepaid replies, which ensures to Governments the usual reductions.

Having by this and other means compressed the estimates to a minimum, the Board was still faced by a deficit of some 60,000 gold francs over the Rockefeller subsidy of 125,000 gold francs. India, Japan and China proposed, and the Board passed, a resolution express-

ing the belief that the League should itself contribute, and members declared the willingness of their Governments to subscribe as follows :

French Indo-China	6,000 Singapore dollars,	in addition to free broadcasting.
Dutch East Indies	10,000 ,, ,,	in addition to free broadcasting.
Straits Settlements	5,000 ,, ,,	(paid in September).
Siam	2,000 ,, ,,	
China	2,000 ,, ,,	(paid).
Japan	7,000 to 10,000 Yen,	in proportion to other subscriptions, to be raised to 15,000 Yen should the Deputy-Director be a Japanese medical officer.

India, Australia and Ceylon offered to pay for cables, Australia adding a "pro rata" for general expenditure. The Philippines made a similar declaration for 1926, promising at least 5,000 Singapore dollars for 1927 and emphasising that the payment is expressly authorised by the home Government. The Federated Malay States and North Borneo hope to pay this year a few thousands each, and Hong-Kong 5,000 Singapore dollars from 1927 onwards. The deficit is thus amply covered.

The Board further decided to ask the Health Committee to start serious studies of the great public health problems of the East, and in particular to set up expert committees for the co-ordination of enquiries into the value of oral vaccination against acute intestinal infections, into endemic centres of cholera, into certain aspects of bubonic plague and into the possibility of corporate action for the study of pneumonic plague on the lines of the Sleeping-Sickness Mission. A study of tuberculosis was also recommended on lines analogous to those proposed by the South African Union. I may remind the Committee that Dr. Tsurumi, at the October session, made somewhat similar proposals, which were approved in principle and will come up for consideration in April.

The session of the Advisory Council was certainly very successful. The resolution of the Health Committee approved by the Council recommending the creation of the Advisory Council stated that one or two representatives of the Health Organisation should be added as members, and that one of them should take the chair. The Health Committee expected that Dr. Jitta, Chairman of the Far Eastern Commission of the Committee, would be able to attend the Singapore Conference. I thought that a member of the Secretariat could not preside over a Technical Commission, and it seemed to me that the Advisory Council formed a special Sub-Committee of the Far Eastern Commission, and was therefore in fact presided over by Dr. Jitta, but as a special Sub-Committee it should constitute itself by electing its officers. In view of the importance of British India from the public health standpoint, and in view of the personal distinction of her representative, Colonel Graham was asked to take the chair, and the French, Dutch, Chinese, Japanese and Siamese delegates were elected Vice-Chairmen.

It would be useful to reconsider the constitution of the Board. This opportunity will be provided in 1927, because the mandate of the Health Committee terminates at the end of this year and, constitutionally, all of its sub-committees and commissions would have to be reappointed. Of course, the continuity of the work will be assured and, with the exception of one or two temporary sub-committees, the majority will continue their work.

The Bureau, as the only League institution in the Far East, attracts considerable attention, particularly in Japan, China, French Indo-China and the Dutch East Indies and British India. Requests for information regarding the League are frequently addressed to the Bureau. The Japanese Ministry of the Interior and the Foreign Office emphasised their interest in the Bureau, provided that it should have no executive functions and that its character be strictly international. The Dutch and the French welcome the link established with our Health Organisation, and British India thinks that it shows, in its activities and development, a guarantee that the League will take a real interest in the public health problems of the East.

It is obvious to me that a Deputy-Director should be appointed with the least possible delay.

I feel confident that the highly satisfactory character of the Bureau's work will be fully acknowledged at the forthcoming International Sanitary Conference and that the Conference will entrust definite duties to the Bureau as a centre of epidemiological intelligence. Its existence and the development of its work facilitate greatly the work of the Sanitary, Maritime and Quarantine Service of Egypt. It was obvious to me that the administrations in the East are somewhat bewildered at the continuous co-existence of several international health organisations and are rather anxious that some final permanent order should be evolved as soon as possible.

I need not go into any details of the scheme of researches proposed by the Singapore Advisory Council, as the resolutions of its January session are already in the hands of the Committee, but I wish to emphasise the real importance of these researches both from the point of view of the sanitary administration in the Far East and of international public health.

The Committee has wished for some years to further investigations as to the value of oral vaccination against intestinal diseases. The suggested expert committee, composed of directors of research of the several countries in the Far East as well as of recognised experts on the subject, might be set up as soon as we receive the nominations from the interested administrations, but the Committee might wish at this session to appoint the two or three outside experts. The Committee may desire also to ask Professor Shiga to take a leading part in the work of this Committee.

The Committee has already shown its interest in the study of the endemic foci of cholera by the publication of the report by Dr. Russell on experience in India and by Dr. Cazeneuve

and Professor Barikine on the European focus round Rostof-on-Don. The Committee will no doubt await the detailed scheme of investigation to be proposed by the special expert committee before deciding as to the precise nature of the assistance which may be given by our Organisation. But there should be no difficulty in obtaining information on this question before the October session of the Committee.

The Singapore Bureau will doubtless prepare a memorandum on the rat and flea survey in the ports, and this would form a basis for discussion by the special committee which it is suggested should be set up.

The problem of pneumonic plague needs consideration in some detail. Dr. Cazeneuve is submitting to the Committee his personal observations and his experience gained this summer in Eastern Siberia. Dr. Wu-Lien-Teh, the distinguished Head of the Chinese anti-plague service at Kharbin, is presenting to the Committee an exhaustive study of the present world situation as regards the prevalence and epidemiology of pneumonic plague as well as the present state of research on this subject. The question is of very considerable interest for the public health service in China, in the Far East Soviet Republic, in Japan, British India, the Dutch East Indies and South Africa. The present period of calm might well be utilised for a co-ordinated survey of the endemic area by a team of research workers representing the institutes and the specialist services of the countries interested. I have already referred to the importance attached to this question by the Sanitary Service of the South Manchurian Railway Company and the possibility of effective assistance on its part.

* * *

I wish to apologise for the sketchy character of this report. It was obviously impossible for me to make a thorough study of the organisation of the public health services of the Far East, however fascinating this subject may be. My main object was to ascertain how far the Health Organisation of the League could be instrumental in assisting the sanitary administrations in that part of the world in the solution of their different problems, many of which are of great international importance. I attempted to explain the methods and the wishes of the International Health Organisation, and I believe I have rightly interpreted the intentions of the Committee by assuring the leaders of public health in the Far East of our very real anxiety to establish the closest working relations with them.

Appendice I. — Appendix I.

SPÉCIMEN DU REGISTRE DE RECENSEMENT DU COMMISSARIAT DE POLICE
EXAMPLE OF CENSUS REGISTER OF POLICE-STATION.

(Résumé dans chaque livre, en première page.)
(A summary made in each book, keeping it on first page.)

PERSONNES DONT LA RÉSIDENCE EST PERMANENTE.
PERMANENT RESIDENTS.

Carte. — Card.

Nom du Bureau de Police du district. Name of police-station of the district concerned.

Carte. — Card

Nom du district	Nº de la Maison . . . .
	House number . . . .
Name of district	De. . . . .
	From . . . .
	A . . . .
	To . . . .

Carte. — Card.

Nombre total des maisons. . . . .
Total number of houses. . . . .

Carte. — Card.

Chiffre total de la population :	Hommes . . . .
Total number of population :	Male . . . .
	Femmes . . . .
	Female. . . . .

SUR PAPIER ROUGE. — ON RED PAPER.

Spécimens de cartes pour personnes dont la résidence est permanente.
Specimen Cards for Persons living in Permanent Residence.

Recto. — Front.

Nº de l'immeuble et nom de la rue et du district	Genre d'immeuble . . . .
	Nature of building. . . . .
Number of house and name of street and district	Dimensions de l'immeuble. . . . . . .
	Size of building . . . .

Verso. — Back.

Loyer	Yen	Somme déposée . . .	Date du contrat . . . .
Rent	Yen	Deposit . . .	Date of contract . . . .

SUR PAPIER ROUGE. — ON RED PAPER

Utilisée dans le cas où l'immeuble et le terrain appartiennent à deux personnes différentes.
For use if House and Estate belong to two different Persons.

Recto. — Front.

Immeuble : House :	Nom du propriétaire . . . . . . Name of owner. . . . . Nom du régisseur . . . . Name of supervisor	Nom de la rue . . . . . . Name of street . . . . . . Nom de la rue. . . . . . . Name of street . . . . . .

Verso. — Back.

Terrains : Estate :	Nom du propriétaire . . . . . . Name of owner. . . . . Nom du régisseur . . . . Name of supervisor.	Nom de la rue. . . . . . . Name of street . . . . . . Nom de la rue . . . . . . Name of street . . . . . .

Carte. — *Card*

Indiquer, s'il y a lieu, les titres, le rang à la Cour, la classe dans un ordre, etc. If titled, rank at Court, class of an order, etc.	CHEF DE FAMILLE. . . . . HEAD OF FAMILY. . . . . Nom . . . . Name. . . . . Emplacement et date de naissance . . . . Place and date of birth . . . .

Carte. — *Card*

EPOUSE : WIFE :	Nom . . . . Name. . . . . Date de naissance . . . . Date of birth . . . .

Carte. — *Card.*

Recto. — Front.

FILS AINÉ : FIRST SON :	Nom . . . . Name. . . . . Date de naissance . . . . Date of birth . . . .

Verso. — Back.

Aliéné . Insane .

Carte. — *Card.*

DEUXIÈME FILS : SECOND SON :	Nom . . . . Name. . . . . Date de naissance . . . . Date of birth . . . .

Carte. — *Card.*

Recto. — Front.

TROISIÈME FILS : THIRD SON :	Nom . . . . Name . . . . Date de naissance . . . . Date of birth . . . .

Spécimen de carte pour une personne absente.
Example of Card for Absentees.

Verso. — Back.

Fréquentant l'école : Attending school :	
Nom de l'Ecole.	Date d'admission. . . . .
Name of school.	Date of admission.. . . . .
Lieu.	
Place	

Carte. — Card.

Recto. — Front.

QUATRIÈME FILS : FOURTH SON :	Nom . . . . Name. . . . . Date de naissance . . . . Date of birth . . . .

Spécimen d'observations
Example of Remarks.

Verso. — Back.

Jeune homme de mœurs dépravées.	Depraved youth.

Carte. — Card.

PREMIÈRE FILLE :	FIRST DAUGHTER :
Nom	Name . . . .
Date de naissance	Date of birth. . . . .
Vaccinée trois fois.	Vaccinated three times.

Carte. — Card.

Epouse de	Wife of . . . .
Nom.	Name . . . .
Date de naissance.	Date of birth . . . .

Carte. — Card.

Fille de	Daughter of. . . . .
Nom.	Name. . . . .
Date de naissance.	Date of birth. . . . .
Vaccinée une fois.	Vaccinated once.

Carte.

à l'usage des étudiants domestiques vivant dans la famille.

Card.

For Servant-Student in Family.

Recto. — Front.

ETUDIANT-DOMESTIQUE :	SERVANT-STUDENT :
Domicile permanent.	Permanent domicile . . . .
Nom.	Name. . . . .
Entretenu par la famille	Maintained by family . . . .
Date de naissance.	Date of birth . . . .

Spécimen. — Example.

Verso. — Back.

Suspect de vol.	Suspected of theft.

Carte à l'usage d'une personne employée par la famille	*Card For Employee of Family*

Recto. — Front.

Domicile permanent	Permanent domicile . . . .
Premier fils de	First son of . . . .
Nom	Name . . . .
Date de naissance	Date of birth . . . .
Employé depuis	Employed since . . . .

Spécimen. — Example.

Verso. — Back.

Antérieurement inculpé de vol	Previously convicted of theft . . . . . .
Date et genre de punition	Date and nature of punishment . . . .

Personnes dont la résidence est temporaire.
Persons in Temporary Residence.

Sur papier rouge. — On Red Paper

Carte. — Card.

Recto. — Front.

Nº de l'immeuble	No. of house . . . .
Genre et dimensions de l'immeuble . . .	Nature and size of building . . . .
Nom de la rue et du district	Name of street and district . . . .

Verso. — Back.

Loyer . . . .(Yen)	Rent . . . . (Yen)
Somme déposée . . . .(Yen)	Deposit . . . . (Yen)
Date du contrat	Date of contract . . . .

Sur papier rouge. — On Red Paper.

Carte (utilisée dans le cas où l'immeuble et le terrain appartiennent à deux personnes différentes).	*Card (Provision for case of owner of House and Estate being two different persons).*

Recto. — Front.

Propriétaire	Owner . . . .
Immeuble	House . . . .
Régisseur	Supervisor . . . .
Nom de la rue	Name of street . . . .

Verso. — Back.

Propriétaire	Owner . . . .
Terrain	Estate . . . .
Régisseur	Supervisor . . . .
Nom de la rue	Name of street . . . .

Carte. — Card.

Chef de famille :	Head of Family :
Nom	Name . . . .
Profession	Profession . . . .
Lieu de résidence permanente	Place of permanent residence . . . . . .
Date de naissance	Date of birth . . . .

Carte. — Card.

Mère :	Mother :
Nom	Name . . . .
Date de naissance	Date of birth . . . .

Carte. — *Card.*

EPOUSE :	WIFE :
Première fille de	First daughter of . . . .
(Non légalement reconnue.)	(Not legally recognised.)
(Résidence permanente.)	(Permanent residence.)
Nom.	Name. . . . .
Date de naissance.	Date of birth . . . .

Carte. — *Card.*

Recto. — Front.

PREMIER FILS :	FIRST SON :
Nom	Name. . . . .
Date de naissance	Date of birth . . . .

Spécimen. — *Example.*

Verso. — Back.

Date d'entrée dans un régiment d'infanterie.	Date of entering Infantry Regiment.
. . . .	. . . .

Carte. — *Card.*

Verso. — Back.

FRÈRE (du chef de famille) :	BROTHER (of Head of Family) :
Nom.	Name. . . . .
Employé de la Compagnie.	Employee of the company . . . .
Date de naissance	Date of birth . . . .

Carte. — *Card.*

Recto. — Front.

FRÈRE :	BROTHER :
Nom.	Name. . . . .
Conducteur d'automobile de la Compagnie	Auto-driver of the company . . . . . .
Fils respecteux.	An obedient son.
A eu la variole.	Has had smallpox.
Date de naissance.	Date of birth . . . .

Carte. — *Card.*

Verso. — Back.

A des sentiments filiaux si développés qu'il a pris soin de sa mère pendant sa maladie. depuis (date).	Is so filial that he has cared for his mother during her illness since (date). . . . . .
Ses voisins font les plus vifs éloges de son dévouement.	Is highly commended by his neighbours for his devotion.

Carte (pour visiteur). — *Card (for visitor).*

Lieu de résidence permanent	Place of permanent residence. . . . . . .
Première fille de.	First daughter of . . . .
Date du mariage	Date of marriage. . . . .
Epouse de.	Wife of . . . .
(Muette.)	(Is dumb.)
Nom.	Name. . . . .
Date de naissance.	Date of birth. . . . .

Carte (pour étudiant). — *Card (for Student).*

Etudiant en	Student of . . . .
Ecole de	School at . . . .
Lieu de naissance.	Birthplace. . . . .
(Pensionnaire de la famille)	(Boarder in house)
Nom.	Name. . . . .
Date de naissance.	Date of birth . . . .

Etrangers. — Foreigners.

Carte. — *Card.*

Recto. — Front.

N° de la maison	Number of house. . . . .
Nom de la rue et son district	Name of street and district . . . .
Genre et dimensions de l'immeuble . . .	Kind and size of building . . . .

Verso. — Back.

Loyer . . . .(Yen)	Rent . . . .(Yen)
Somme déposée. . . . .(Yen)	Deposit . . . .(Yen)
Date du bail	Date of the lease . . . .

Sur papier rouge. — On Red Paper.

Recto. — Front.

Propriétaire	Owner . . . .
Immeuble	House. . . . .
Nom de la rue	Name of street . . . .
Régisseur	Supervisor. . . . .

(A utiliser si le terrain et l'immeuble appartiennent à deux personnes différentes.)
(For use if Estate and House belong to two different persons.)

Verso. — Back.

Propriétaire	Owner . . . .
Terrain	Estate . . . .
Regisseur	Supervisor. . . . .
Nom de la rue.	Name of street . . . .

Carte. — *Card.*

Professeur d'école :	Teacher of School :
Nationalité.	Nationality . . . .
Ville.	City or Town . . . .
Nom.	Name. . . . .
Date de naissance	Date of birth . . . .

Carte. — *Card.*

Epouse du professeur :	Wife of Teacher :
Nationalité.	Nationality . . . .
Ville	Town. . . . .
Troisième fille de	Third daughter of . . . .
Nom	Name. . . . .
Date de naissance.	Date of birth. . . . .

Carte. — *Card.*

Employé :	Employee :
Employé depuis.	Employed since . . . .
Lieu de naissance.	Birthplace. . . . .
Nom des parents	Name of parents . . . .
Nom et date de naissance	Name and date of birth. . . . .

Appendix II.

PROVINCIAL HEALTH ORGANISATION : EXAMPLE OF SAITAMA PREFECTURE.

- Governor of the Prefecture.
  - Department of the Interior.
    - District Section.
    - Educational Section (1 school physician).
    - Social Work Section.
    - Agriculture Section (6 veterinary surgeons).
    - Commercial and Industrial Section.
    - Civil Engineering Section.
    - River Conservancy Section.
    - Accountant Section.
      - City Office.
      - District Office.
        - Town Office
        - Village Office.
          - Establishment of hospitals for infectious diseases, isolation houses and their management.
          - Admittance of infectious-disease patients, disinfection and isolation of suspects.
          - Smallpox vaccination.
          - Treatment of trachoma patients.
          - Custody of insane persons.
          - Disposal of refuse and garbage.
          - Establishment of waterworks, sewerage and their management.
          - Establishment of primary schools and their management.
          - Other health services for which cities, towns and villages are responsible.
  - Police Department.
    - Sanitary Section
      - 10 physicians.
      - 3 pharmacists.
      - 10 veterinary surgeons.
      - 32 others.
    - Public Peace Section.
    - Police Section.
    - Factory Section
      - Technical experts of Sanitary Section act as experts.
        - Police Station.
        - Police Sub-Stations (one or two in each city and district).
          - Police Post. (many of them in each city and town.)
          - Policeman's office (one or two in each village.)
            - Prevention of acute or chronic infectious diseases.
            - Control of foods, drinks and medicines.
            - Control of medical practitioners and pharmacists.
            - Other matters relating to public health.

Appendix III.

SUMMARY OF VACCINATION LAW. CERTIFICATION OF VACCINATION, AND THE NUMBER OF VACCINATIONS IN JAPAN.

Summary of the Vaccination Laws and Regulations in Japan.

Vaccination shall take place in the following two periods :

First period. — From birth till June of the following year ; if, however, the vaccination is unsuccessful, it shall be repeated during the period ending June of the year following the latter year.

Second period. — The year in which a person completes his ninth year ; if, however, the vaccination is unsuccessful, it must be repeated during the period ending December of the following year.

The protector or the guardian is obliged to cause minors under his protection or supervision to be vaccinated. The city, town or village must carry out the vaccination and the head thereof must assign the day for vaccination of those who have reached the period of vaccination ; on the other hand, he must communicate to the census-register officer the name of the persons who have undergone vaccination of the first period or have not required such vaccination, and the latter officer must enter the fact by making a mark on the margin of the census register.

The head of the city, town or village must grant a certificate of completion of vaccination to a person who passed the medical examination.

When the physician has examined a person upon whom he has performed a periodical vaccination, he must give a certificate of vaccination. In this case the protector or the guardian who has received it must report the fact within ten days to the head of the city, town or village.

The local Governor may order special vaccination if he considers it necessary.

The following are samples of certificates of vaccination :

Certificate of Completion of the First Vaccination of the First (Second) Period.

Name . . . .
Parentage and date of birth . . . .
Address . . . .
Vaccination in (month and year) unsuccessful.
The above-mentioned should be revaccinated.

Date . . . .

(*Signed*) . . . .

Mayor of . . . . City (Headman of
. . . . . . Town or . . . . Village).
in . . . . District
. . . . Prefecture

Caution. — This certificate should be kept until revaccination.

Certificate of Completion of Vaccination of the First Period.

(To be given to a person whose first or second vaccination of the first period has been unsuccessful.)

Name . . . .
Parentage and date of birth . . . .
Address . . . .
Vaccination (first or second) in (month and year) . . . .
Successful ; . . . . . . papules.

I hereby certify that vaccination of the first period has been completed.

Date . . . .

(*Signed*) . . . .

Mayor of . . . . (City) (Headman of
. . . . Town or . . . . Village)
in . . . . District
. . . . Prefecture

Caution. — This certificate should be kept until vaccination of the second period takes place ; if its holder, upon being so required by a competent officer, is unable to produce it or has no other proof in its place, he will be liable to a fine not exceeding ten yen.

Certificate of Completion of Vaccination of the Second Period.

(To be given to a person whose first or second vaccination of the second period has been successful.)

Name . . . .
Parentage and date of birth . . . .
Address . . . .

Vaccination (first or second) in (year and month) successful.

I hereby certify that the above-mentioned has completed the vaccination of the second period.

Date . . . .

(*Signed*). . . . .

Mayor of . . . . City (Headman of . . . . Town or . . . . Village) in . . . . District . . . . Prefecture.

Caution. — This certificate should be kept until its holder is twenty years of age; if, upon being so required by a competent officer, he is unable to produce it or has no other proof in its place, he will be liable to a fine not exceeding ten yen.

Information for Examination of the Result of Vaccination.

Present Residence . . . .
Name . . . .
Date of birth . . . .

After examination of the papules a certificate will be given, and the bearer is requested to present this information at the District Office between . . . . o'clock and . . . . o'clock.

Date . . . .
District Office . . . .

N.B. — If for any reason he is unable to be examined on the date specified, a report to that effect shall be made. If this is not done, his (or her) protector or the person responsible for him (or her) will be liable to a fine.

Number and Percentage of Public and Private Vaccinations in Japan in 1923.

The total number of vaccinations of the first period carried out in 1923 was 1,727,376, of which 1,590,716 were successful, 76,877 were unsuccessful, and 59,783 unexamined. The total number of vaccinations of the second period was 1,637,906, of which 1,000,871 were successful, 604,537 were unsuccessful, and 32,498 unexamined. The following table gives the number of public and private vaccinations and vaccinations for the first and second time in each period :

		1st-time Vaccination	2nd-time Vaccination
	First Period.		
Public Vaccinations :	Successful	1,480,538	68,413
	Unsuccessful	56,488	19,084
	Not examined	54,655	5,128
	Total	1,591,681	92,625
Private Vaccinations :	Successful	40,573	1,192
	Unsuccessful	978	327
	Total	41,551	1,519
	Second Period.		
Public Vaccinations :	Successful	923,115	72,706
	Unsuccessful	400,033	200,422
	Not examined	26,747	5,751
	Total	1,349,895	278,879
Private Vaccinations :	Successful	4,377	673
	Unsuccessful	2,744	1,338
	Total	7,121	2,011

The following table is the percentage of successful vaccinations (the percentages for the preceding four years are also given for comparison) :

First Period.

		1919	1920	1921	1922	1923
Public Vaccinations :	1st time	92.7	90.2	94.9	95.9	96.3
	2nd time	67.2	61.4	69.2	72.5	78.2
Private Vaccinations :	1st time	86.9	94.5	97.1	96.3	97.7
	2nd time	66.7	63.8	75.7	76.9	78.5

Second Period.

		1919	1920	1921	1922	1923
Public Vaccinations :	1st time	60.6	57.7	63.2	67.9	69.8
	2nd time	25.5	23.1	27.4	26.5	26.6
Private Vaccinations :	1st time	66.9	52.9	56.8	70.8	61.5
	2nd time	30.3	24.3	24.2	28.2	33.5

The following table gives the percentage of those persons who should have been vaccinated in 1923 but were prevented therefrom by illness or other causes :

	1919	1920	1921	1922	1923
First Period	11.9	12.6	11.7	13.7	12.7
Second Period	7.2	6.4	6.0	6.7	6.3

EXTRAITS DU REGISTRE DE VACCINATION TENU PAR LE BUREAU DU DISTRICT DE SHIBA, TOKIO. — PREMIÈRE PÉRIODE DE 1925.

EXTRACTS FROM VACCINATION REGISTER KEPT IN SHIBA DISTRICT OFFICE, TOKIO. — FIRST PERIOD OF 1925.

Nom de la personne qui doit être vaccinée. Name of person to be vaccinated.	Date de naissance. Date of birth.	Domicile permanent. Permanent domicile. Domicile actuel. Present domicile. Nom des parents ou tuteurs. Name of parents or guardians.	Vaccination. Date de vaccination Date of vaccination	Vaccination. Nombre de vaccinations subies. Number of times vaccinated.	Vaccination. Avec succès ou sans succès. Successful or unsuccessful.	Vaccination. Vaccination par les soins d'un service public ou d'un médecin particulier. Public or private vaccination.	Vaccination. Raisons pour lesquelles la personne en question n'a pas été vaccinée. Reason for not being vaccinated.	Observations. Remarks.
. . . . Fils illégitime. Illegitimate son.	Octobre 1924 October 1924							La résidence n'est pas connue du Bureau municipal (mai 1925) ni du Bureau de police. Residence not known by Municipal Office (May 1925) or by Police Office.
. . . . Deuxième fille. Second daughter.	Octobre 1924 October 1924							N'est pas connue du Bureau municipal. Le Bureau de police fait connaître que la personne en question a déménagé au N° 2, Misaki dro Kanda, Tokio. Not known to Municipal Office. Police Office informs removed to No. 2, Misaki dro Kanda, Tokio.
. . . . Troisième fils. Third son.	Décembre 1924 December 1924							N'est pas connu du Bureau municipal. Résidence actuelle N° 4, Atagoshila, Tokio. Not known by Municipal Office. Present residence No. 4 Atagoshila, Tokio.
. . . . Troisième fille. Third daughter.	Octobre 1924 October 1924		1er Juin June 1		Avec succès. Successful.	Par les soins d'un service officiel Official.		
. . . . Deuxième fille. Second daughter.	Février 1924 February 1924			4	Avec succès. Successful.	Par les soins d'un médecin particulier. Private.		A déménagé au N° 2, Kobiki dro Kyobashi. Removed to No. 2, Kobiki dro Kyobashi.

FORMULAIRE DU REGISTRE DE LA VACCINATION PAR LES SOINS D'UN MÉDECIN PARTICULIER

FORM OF REGISTER OF PRIVATE VACCINATION

Date à laquelle les renseignements concernant la vaccination par les soins d'un médecin particulier ont été reçus. Date when information received regarding private vaccination.	Personne vaccinée. Person vaccinated.		Adresse Address		Nom des parents ou tuteurs. Name of parents or guardians.	Vaccination.			Nom du médecin qui a délivré le certificat. Name of physician who gave certificate	Chef du Service municipal. Head of Municipal Office.	Chef du Service. Head of Section.	Chef du service de vaccination. Chief of Vaccination.	Personne assurant le service. Person in charge.
	Nom. Name.	Date de naissance. Date of birth.	Actuelle. Present.	Permanente. Permanent.		Date de vaccination. Date of vaccination.	Date de la délivrance du certificat. Date on which certificate given.	Nombre de pustules qui ont pris. Number of papules taken.					

C.H. 464.

Annex 82.

NOTE BY SIR G. BUCHANAN ON THE REPORTS ON THE EASTERN BUREAU AT SINGAPORE.

On reading the documents to be presented at this session :

(1) The Annual Report for 1925 and the Minutes of the Advisory Council meeting ;

(2) The summary of the above report (Geneva, doc. C.H. 419) ;

(3) The observations in the Medical Director's Report to the Health Committee, April 1926 (Geneva, doc. C.H. 433) ;

a few considerations occur to me which I may set out for convenience of discussion.

(1) *The practical utility of the service of epidemic information now established.* — The Advisory Council has done a most useful service for us in considering the scope of the daily work which is being undertaken at the Singapore Office. We are particularly indebted to the Council for valuable suggestions made on Dr. Brooke's report, *e.g.*, as to the simplification of communications and publications, the use of telegraph and wireless facilities, office arrangements, and finance. It has also, and I think wisely, advised against the scheme of extending the activities of the Bureau to the control of animal diseases.

The main lines on which information is being obtained and distributed may now be regarded as fairly settled. With this stabilisation, and after another year's experience, the Council may be able at its next and subsequent sessions profitably to study still more closely the use of the information by the participating administrations. It would, I think, be particularly interesting to the Health Committee to know and profit from the experience which is gained regarding this matter in the Far East. There are two conceptions of an office for epidemiological intelligence : (1) a centre from which the general march of epidemic disease in the area covered is watched, movements of population likely to affect the incidence of epidemics are observed, and so forth ; (2) a more restricted system of information relating to the occurrence of certain epidemic diseases week by week in specified ports.

The Singapore Office has advanced in both directions, but especially in the second, in view of the more direct application of this method to problems of quarantine.. It may be observed, however, that both kinds of information are applicable and both are desirable if quarantine measures are to be reasonably guided. It is desirable, indeed, to look with some caution on a service of information which is too strictly limited to the large seaports. The considerations which should determine a quarantine authority in deciding on the nature of the examination to be made on the arrival of a ship are many, and the figures of infectious diseases from some particular port at which the vessel has touched are only one of many elements.

The system at present pursued is necessarily applicable only to a limited number of ports, and it is interesting to note that the Council has already felt difficulty in knowing what the word "port" should signify. The appearance of a "zero" or "nil" return of infectious disease for a particular port obviously has a very different significance when the term "port" merely includes the docks and water of the port than when it includes the maritime town, while there is the additional disturbing element of what constitutes the town itself, and how far the notification extends to its environs.

To my mind it is hardly practicable to adopt the suggestion of the Advisory Council and attempt the definition of the port in the International Sanitary Convention. This would indeed be undesirable in principle as tending to over-emphasise the importance of the exact port figures for executive quarantine purposes. The better method would seem to be to invite the authorities concerned individually to keep the Singapore Office informed of the significance of the notifications which they furnish, and, whenever the opportunity offers itself, to consider the way in which the information supplied can be extended and enlarged so as to give further and still more useful information and over wider areas than is at present given.

One would be glad also, at a future session of the Advisory Council, to obtain observations from this representative body on the actual way in which the information supplied by the telegrams and bulletins are utilised in port sanitary work. Such experience would be valuable outside the Far East, and the subject might advantageously take a permanent place on the Agenda of the Advisory Council.

(2) *The Inner Committee of President and Vice-Presidents.* — An office which aims at being of general utility for so large an area requires an Advisory Council consisting of representatives from all the countries in the area served which desire to send them. All the countries originally taking part in the establishment of the office have been invited to send representatives to the Advisory Council, and it can only benefit by being as comprehensive as possible. Representatives of every country which is sufficiently interested to send a delegate at its own expense to the Council ought to be welcomed. Such a Council would have the same great advantage as is possessed by the Committee of the Office international d'hygiène

publique. All countries and administrations interested, whether large or small, are represented by official delegates on an equal footing.

The Office is a branch of the Medical Secretariat at Geneva, to which it is directly responsible and its personnel is appointed by the League. I look with some misgiving on the proposal that the President and five Vice-Presidents of the Advisory Council should constitute a kind of executive committee which may meet during the interval between sessions of the Council in order to discuss the questions to be brought up before the Council for consideration and decision, and to formulate policies for the Office. It is difficult to realise in what respects the policy of an office which is established for the primary duty of supplying information about epidemics for the use of the great seaports of the East is advantageously to be directed by an inner committee which has no representative of such great seaports as Singapore, Hong-Kong and Colombo.

The principle adopted in the choice of Vice-Presidents seems to me quite a natural one for the ordinary purposes of an international meeting. Certain honorary appointments of Vice-Presidents are made in the selection of which it is obviously desirable to have members of as many nations as possible. For such honorary duties there is no need to take account of the fact that British Colonies such as Ceylon, Hong-Kong, and the Straits Settlements are, in administrative matters, independent units. The recognition of British nationality by the inclusion of some one member from British India or from one of the British Colonies is amply sufficient. But other considerations must come into play, when the question is one of proposing or determining the policy of the Bureau in the intervals of the meetings. The countries excluded from participation are fully as interested in the development of the Office as those which are included and they are to be pressed just as hard to make financial contributions to the Office as the favoured countries.

It is not easy to see how in practice these six members are to meet in the intervals of sessions. They would have to come hundreds, and in three cases, thousands, of miles, at a loss of a large amount of official time.

If the League, or the funds of the Singapore Bureau, are to pay their travelling expenses, a very heavy cost would be incurred. It may be said that they need not meet, but that the Director at Singapore, or our Medical Director at Geneva, can take their advice by correspondence. But if advice on the policy of the Office has to be collected by correspondence, what reason is there for omitting the countries in which the great ports of the East are situated?

To sum up under this head, I would suggest that the Health Committee should cordially approve (if its approval is necessary) the appointments of the President and five distinguished Vice-Presidents which were made at the Singapore Conference, and similarly should approve other nominations to those offices made at future sessions of the Advisory Council, but that no action should be taken by the Health Committee or the Health Section of the League in regard to that part of resolution IX which empowers the President and the five Vice-Presidents to meet during the interval of sessions to discuss and formulate policy.

(3) *The use of the Office for new duties of research in the East.* — The Advisory Council gave expression to an opinion which the Health Committee is certain to welcome when it urged that greater attention should be paid to the facilities which eastern public health administrations and eastern public health and medical institutes afford for enquiries into disease prevalence which are of special international interest and importance. Our Health Committee will be certain to welcome this expression of opinion, and to occupy itself with consideration of means by which effect can be given to it. The Advisory Council gives some examples of the kind of work desired ; for example, testing the value of administering vaccines by the mouth, studying endemic foci of cholera, and the study of the endemic centres of pneumonic plague.

How may the League of Nations Health Organisation best assist the promotion of investigations of this kind ? The first consideration seems to be finance. No advantage would be gained by interposing the League of Nations in the Far East as a means merely of supplying the investigators with money from the Rockefeller Foundation. Unless I am mistaken, the beneficent activities of the Rockefeller Foundation are so well known in the East and their methods are so much appreciated that no institution or administration would feel the need of approaching New York by the road of Singapore instead of going to New York direct. Nor can it be said that the services of the League are required merely for the purpose of the publication of reports. In my experience there are few subjects on which reports of new investigations obtain fuller medical publicity already than do questions of tropical medicine in the many journals devoted to that subject. If we are to comply with this request, therefore, as I think we should, we must be prepared to consider an allocation of a portion of our annual budget (*i.e.* that imputable to the League) for Eastern work. If we ear-mark a sum for this purpose, we can assist particular public health administrations or institutions. In return for our subsidy, they can take up lines of investigation which the Health Committee has considered and regards as advantageous from the point of view of the international health work.

Given the possibility of funds, the best procedure in relation to each of the subjects suggested by the Advisory Council appears to be to select some one administration or institute as the centre in which the required investigation (oral vaccination, pneumonic plague centres, etc.) should be undertaken.

Collaboration with other Eastern countries in which the same work might be done would be the concern of the centre chosen. The advantage of proceeding in the alternative manner proposed in resolution VII of the Advisory Council is not quite evident. According to this suggestion, we are not to obtain and support programmes of practical work from particular

administrations or institutes. We are to begin by setting up *expert committees* composed of directors of research and other experts in the several countries. These committees are to draw up programmes of study, agree on procedure to be followed for the inter-communication of results and for mutual co-operation, and they are to work through a technical secretariat provided at Singapore.

This idea has been further developed in the Medical Director's report. He refers, for example, to an expert committee to investigate vaccination by the mouth. It is to be composed of directors of research of the several countries in the Far East as well as of the recognised experts on the subject to be set up "as soon as we receive nominations from the interested administrations". Professor Shiga would be asked to take a leading part in this Committee — presumably as President. The Medical Director suggests also that the activities of this and other committees are to be provided for by an increase of staff at the Singapore Office. It is proposed also that the future director of the Office shall have the duty of ensuring permanent contact between various sanitary administrations, and shall spend a great part of his time in travelling.

One doubts whether this sort of procedure is not a beginning at the wrong end: first the superimposition on the Advisory Council of a Council of five to determine policy; then the creation of committees of the directors of institutes thousands of miles from each other, whose physical difficulties of meeting as a committee are to be met by a peripatetic co-ordinator, who apparently would need to be himself a competent expert in each of the subjects investigated if his extensive travelling is to be justified. This kind of procedure seems to me, not only cumbrous, but open to the further objection that the money which we could spare to assist research investigations in the Far East would in large part be swallowed up in the expenses of an unnecessary machinery.

Surely our problem of getting advantage from more work in the Far East is much less complicated and relatively easy if we are content to proceed by degrees on practical questions as they come before us. If, for example, Professor Shiga or someone under his direction in Japan is willing to undertake an investigation into the administration of vaccine by the mouth, but finds a difficulty in doing so on account of lack of staff or funds, is there any reason why, on receipt of appropriate information, the Health Committee should not make an appropriation out of its budget? If his laboratory desires communication with other laboratories in the East on the matter, it is impossible to believe that he will find any difficulty in getting the information which he wanted by direct correspondence or by the use of our system of individual "interchange" without the necessity of inner committees, expert committees, wandering co-ordinators and secretarial staff.

So, too, with the investigation of endemic foci of cholera or of pneumonic plague. Once we accept the principle of inviting institutes or individual administrations to undertake such enquiries, and supporting them as far as possible from our budget, we will automatically receive proposals. In deciding between such proposals, we will have the advantage of discussions at the Advisory Council at Singapore or at our own Advisory Council at Paris, from which often invaluable advice can be also obtained. By proceeding in this way for a few years we could hope to secure some substantial contributions to practical hygiene which in the long run might bring greater credit to the League's Health Organisation than the establishment of the somewhat elaborate mechanism which seems to have been contemplated in the Singapore discussions.

C.H. 471.

Annex 83.

COMMISSION ON PUBLIC HEALTH TRAINING.

Note by Professor Léon Bernard on the Session held at Warsaw.

You will remember that the Commission on Public Health Training met at Warsaw for the opening of the School of Hygiene. The only members of the Commission who were able to attend were Professor Ricardo Jorge and myself. We had the good fortune to meet there several distinguished experts on public health training, through whom we were able to obtain some extremely valuable information.

Before summarising the work of the Commission, I should like to pay a deserved tribute to the magnificent institution we had the honour of visiting, and to its founders and leading spirits. From the outset, the Polish Government, in the midst of difficulties of every kind, political, economic and financial, which hamper its work, has realised that its obligations with regard to public health should not suffer on account of these obstacles; it is a fine example for other nations and the latter — in particular the Western nations — owe Poland a debt of gratitude for the effective protection afforded them by Poland, who has spared no efforts to safeguard the health of her own population and therefore, indirectly, that of her neighbours. Also, we must again pay a tribute to the indefatigable generosity of the Rockefeller Foundation, whose financial assistance and moral support have made the foundation of this new school of hygiene possible. Lastly, I am stating no new fact when I emphasise

that behind these concerted efforts for the promotion of public health we find the untiring activity of our medical director, Dr. Rajchman, who has thus added another chapter to the tale of his achievements. From our knowledge of the work of the Health Committee we have no hesitation in predicting the future of the Warsaw institution.

The purposes of this institution are manifold. It forms one complete whole and is at once a place of instruction and scientific research and a health center — in short, useful both to the population of the country and to the students of the school.

The individual branches of this institution are bound together by technical ties, administrative agreements and topographical proximity.

In Warsaw itself, the Institute of Hygiene being the continuation of the epidemiological center created during the war to fight the epidemics from the East, is provided with fully equipped laboratories staffed with exceptionally able research workers, of whom I shall mention only two, Funk and Hirszfeld, whose splendid bio-chemical and serological work posseses a world-wide reputation.

Other laboratories in the Institute prepare sera and vaccines, and the statistics of production and supply which we were shown bear witness to their work. Further, an insulin which is accounted among the best is manufactured there. Others exercise supervision over pharmaceutical products, biological products of private manufacture and food products. Others, again, devote themselves to the researches demanded by the medical profession and are open to the latter as well as to the public.

It is hardly necessary for me to say that the installation and equipment of the Institute meet all general requirements and fully satisfy the demands of modern technology.

The School of Hygiene itself comprises two sections — the School proper where lectures will be given and practical work carried out, and the Amelin Station, which is the health center referred to above. Spacious and well-lighted halls, laboratories for practical work, amphitheatres, library, museum, everything is ready, or nearly so, that is required to meet the needs of a model school. I shall speak later of the curriculum and the programme of work. I must, however, add that beauty has been pleasantly combined with technical utility; the result is a building of fine architectural conception, beautiful, appropriate and yet not sumptuous.

At a distance of three kilometers from this school, in the suburb of Mokotow, the Amelin health center has been set up by the Warsaw municipality. It includes a health bureau, maternity and child-welfare home and anti-venereal and anti-tuberculous dispensaries, an "aerium" for open-air cures for children, a dental clinic, consultation rooms for mental cases and, lastly, a school for nurses and quarters for the students of the School of Hygiene.

This fully equipped sanitary institution will provide a field for practical work for such students. The intention, however, is to make of it also a center of health propaganda so as to improve the health conditions of this poverty-stricken suburb. I have no doubt that, under the enlightened and enthusiastic direction of the men who took us round this institution, this aim will be realised in the near future.

Finally, a few kilometers further away, the Health Institute possesses a farm for its animals; here also the milk is produced which is required for the children under the care of the health center.

I should also mention that the Health Institute possesses branches in five of the principal towns of Poland.

Such is the vast organisation, the originators of which deserve nothing but unstinted praise.

* * *

The Commission on Health Training discussed the programme of the School of Hygiene, which the director of the School, our eminent colleague, Dr. Chodzko, laid before it. It is difficult to say who is the more to be congratulated — the school for having such a director or Dr. Chodzko for being the director of such an institution. The result of so happy an association must spell success.

The course of study will last a year — six months of lectures and research, six months of practical work in the health services and dispensaries. The course of study and research includes the principal subjects which constitute the science of hygiene in general, but with a definite trend towards preventive medicine and social hygiene.

We also heard Dr. Stampar's statement on the course of study at the School in Zagreb, a report by Dr. Frey on the methods of health propaganda in Germany, and, finally, a report by Dr. Wroczynski on health organisation in Poland. These different reports afforded an opportunity for extremely interesting discussions in which M. Scholtz, from Budapest, M. Pelc, from Prague, M. Jonnesco, from Bucharest, and our colleagues from London and Berlin, Dr. Andrew Balfour and Professor Grotjahn, took part.

I would only sum up here the most salient points in these discussions which gave rise to most stimulating exchanges of views, not to say conflicts of ideas.

Controversy was keenest on the subject of the relations between hygienists and the medical profession. These relations were considered from different points of view, but the conclusion which appeared to secure the majority of votes from the members present was that — in spite of many opinions to the contrary — the creation of any differentiation between hygienists and doctors should be avoided. Hygienists should possess theoretical medical training and even, if possible, have practised medicine. In the same way, doctors in the course of their studies should receive a training in preventive medicine which would prepare them for their future duties as the guardians of public health. Thus, if in the Kingdom of the Serbs, Croats and Slovenes M. Stampar refuses to invite doctors to assist in the slightest

degree in sanitary work and appears to be founding (in most admirable fashion, it is true), within the limits of an organisation of public health a department of "public medicine", on the other hand, all the other health experts present urged, in the name of their respective countries, the necessity of close and cordial co-operation between medical practitioners and technical health officials.

Upon the initiative of Prof. Ricardo Jorge, the relations between schools of hygiene and universities were also discussed. The conclusion arrived at was that these relations must necessarily differ according to the particular conditions obtaining in each country and in each institution.

Professor Grotjahn met with unanimous approval when he defined the part which should be assigned to social medicine, bacteriology, epidemiology, political economy and statistics in a complete course of health training.

Finally, the assistance which midwives might give in matters of hygiene was discussed. Here again it seemed impossible to lay down any uniform rule applicable to all countries. In Poland a beginning is being made in this direction and the co-operation of midwives has been organised with profit to that country ; other countries also would no doubt benefit by following this example.

* * *

As will be seen, the problems raised by sanitary training led to the discussion of many cognate problems ; which, indeed, reopened questions concerning the most varied aspects of our science, from the secret foundations of immunology to the medical consequences of social insurance. Considering the multitude and variety of questions which arose in the course of the discussions, it is not surprising that we are still far from having reached final conclusions.

Dr. Chodzko, however, suggested two recommendations which we did not think should be discussed, as only two members of your Commission were present.

The first is to the effect that the Health Section should collect the fullest possible information on the programme of work of schools of hygiene and of special hygiene courses. This wish is natural enough and does no more than put into words one of the tasks enjoined by you upon our Commission, which can only ascertain facts either on the spot or by means of data collected.

The second recommendation is that meetings should be arranged between the directors of schools of hygiene in order that they might exchange views and that all should be able to benefit by individual experience. I am entirely in agreement with this proposal on condition that it should not be carried out until our Commission's work is finished. In my opinion, the institution of such periodical meetings would be a natural sequel to the work of our Commission.

Annex 84.

C.H. 470.

MALARIA COMMISSION.

Report by Dr. Lutrario, Chairman of the Commission, to the Health Committee.

[*Translation.*]

The programme of the Malaria Commission approved by the Health Committee during its last session (October 1925) is in full process of execution ; it has already been put into effect in certain areas and is now being carried out in others.

In accordance with Resolution III, Annex 77 of the Minutes of that session, this comprehensive programme makes provision for :

I. Tours of investigation in 1926 in areas not yet visited by the Commission ;

II. Tours of investigation in countries already visited, with a view to an exhaustive and detailed examination of certain problems ;

III. Laboratory research work ;

IV. Great "bonification" surveys ;

V. Continuation of research work concerning secondary alkaloids of quinquina ;

VI. Courses of study by malariologists in scientific institutes and at the anti-malaria stations ;

VII. Study of the relations between malaria and climatic and meteorological conditions ;

VIII. Preparation of the final report for Europe (see document C.647. M.236. 1925. III, page 95, Committee Minutes), to be submitted to the Committee.

IX. As an appendix : compilation of a glossary (dictionary of the technical terms and expressions employed in malariology).

* * *

Tour of Investigation in Spain.

The Sub-Committee appointed to draft the report on the tour of investigation in Spain met at Paris from March 4th to 6th last, to prepare the text of the report which was adopted by the Plenary Commission and is now submitted for your approval.

You have already had before you the report on this tour, which was extremely interesting (C.H./Malaria/58 (1)). I mentioned it during the preceding session, although it was then still under preparation. I shall, therefore, content myself with drawing attention to the conclusions of the report, which resume the salient features of the malaria campaign in Spain :

1. The most important are the more "primary" measures, especially the prolonged quinine treatment of all known cases.

2. For financial reasons the work is at present limited to certain districts which present the best chances of success. This limitation is comparatively easy owing to the character of the malaria, which is relatively mild in Spain. The reports of the success obtained, although confined to a certain area, act as an incentive to the districts situated beyond the radius of the campaign, and stimulate the authorities to take measures which will eventually extend the area of anti-malarial prophylaxis.

3. The "primary" measures are not applied to the same extent in all the districts where the campaign has been started. It is only in certain districts that the complete and prolonged treatment of the patients who present themselves at the dispensary has been followed by a domiciliary inspection establishing the rate of infection of the entire population. But it must be pointed out that in some cases the confidence of the population in the work of the dispensaries and the devotion of the medical staff compensate to a certain extent for the absence of the systematic searching out of cases.

4. The propaganda carried out by the dispensaries has spread widely among the population. The application of protective measures in their homes, such as the capture of the mosquitoes and the use of mosquito nets, wire netting, etc., has, however, not yet become a habit among the population ; this is not surprising considering that the campaign was only inaugurated three or four years ago.

5. Anti-larval measures and those directed against the adult mosquitoes are applied only in a few districts.

6. Although Spain offers several examples of extensive drainage works, it must be pointed out that these works were not undertaken to prevent malaria, but rather for economic reasons. The health authorities are now devoting special attention to such works.

The results obtained in those districts in which prophylactic measures have been applied are of special value. They show a considerable decrease in the frequency of malaria and a decrease in the general mortality as well as in that from malaria.

The Commission desires to point out that the anti-malarial work carried out in Spain, considering the short time since it was inaugurated and the limited financial resources available offers a striking example of a campaign carried out merely by means of "primary" measures which has achieved a noteworthy success.

I. Tours of Investigation in Districts not visited by the Commission.

(a) *Collective Investigation in Sicily.*

This tour has been adjourned until the autumn of 1926 and is to take place from October 4th to 20th.

An Inspector-General, a Medical Officer of the General Health Department, has already proceeded to Sicily to draw up a new programme of the tour, preliminary information on which is given below. The tour will begin at Palermo with a visit to the minor sanitation works at Mondello, which has been turned into a health resort ; the mountain basin of Piane dei Greci ; and a visit to the dispensaries for special aid for general diseases. Professor Manfredi, of Palermo University, and the sanitary authorities will accompany the Commission.

The tour will then be continued to the mining districts, the very heart of the island, in the province of Caltanissette. This district is interesting on account of the special features which malaria and ankylostomiasis present in an essentially mining district (sulphur). Later a visit to Catania, where there is a station belonging to the Rockefeller Foundation ; and a visit to the "Pantano Lentini", which has now been made healthy. It would, perhaps, be interesting to pay a visit also to a district under cultivation in order to examine on the spot the anti-malarial prophylaxis applied in a district of intensive cultivation.

The tour will terminate at Syracuse, with a visit to the "Anapo" sanitation works.

(b) *Tour in certain Southern States of the United States.*

This tour seems indispensable in order to allow the Commission to draft its final report with full knowledge of all the relevant facts. It presents particularly good opportunities for a detailed examination, in particular of matters relative to minor sanitation measures, which are very generally applied and appear to give most satisfactory results.

In the valley of the Lower Mississippi, for example, in view of the impossibility of drainage, systematic weeding of the water-courses, and regulation of the banks of the rivers, streams and basins has been resorted to and also the construction of dykes in order to give a certain depth and rapidity to the flow of the water. Breeding on a large scale of the *Gambusia affinis* has been undertaken, which, on account of the favourable conditions, has spread to an enormous extent.

These measures have profoundly modified the situation as regards the local anopheles. They are said to have disappeared entirely from several districts.

The members appointed for this tour are Professors Pittaluga and Swellengrebel and Colonel James. Professor Gunn considers that the middle of June would be a favourable time for the start, and, as Professor Ciuca will be in the United States at that time, he would be able to get into touch with the members.

The Director-General of the Rockefeller Foundation, Professor Russell, will shortly forward a detailed programme of the tour in the United States. The help of Surgeon-General Cummings has also been enlisted, and it would be desirable that experts from the Federal Health Service and the Rockefeller Foundation should be able to accompany the members of the Commission during the tour.

II. Tours of Investigation in the Countries already visited. — Question of Deltas.

These tours are to be devoted to a thorough and detailed examination of certain special problems, the list of which will be found under No. II of Resolution III.

For the present the study of the delta question only will be undertaken (Danube, Professor Cantacuzène; Ebro, Professor Pittaluga; Po, Professor Ottolenghi).

A plan of investigation referring to the following points has already been drawn up:

1. Species and habits of the anopheles in places devoid of human dwellings, but inhabited by birds or non-domestic mammals.

2. Mosquito breeding-places in waters exposed to periodical variations of sea salt content owing to tides and sea-currents.

3. Migration of anopheles from uninhabited districts to districts only partially reclaimed, inhabited mainly by fishing folk, or to cultivated districts inhabited by a settled population and domestic animals.

4. Receptivity and power of transmission of anopheles in uninhabited places with respect to the malarial parasite.

Other aspects of the problem would be considered, such as the domesticity of the anopheles in connection with animals living in huts; the habitat, breeding-places and food of the anopheles in the brackish waters of the delta; the variation of the infective power of the *Anopheles maculipennis* in relation to the degree of saltness of its habitat. The investigation of this point is greatly facilitated by the circumstance that, in deltas, water of all degrees of salt concentration is found, from water which is only slightly brackish to water possessing a degree of saltness exceeding that of the sea.

These investigations are of the highest interest to maritime countries in view of the possibility of utilising salt as a means of rendering certain stagnant waters salubrious. This is a question requiring a definite answer in view of the divergence of opinions amongst the investigators concerning the results of this method of destroying the larvæ.

III. Laboratory Research Work.

A considerable amount of research work is being done to clear up certain points of the theory of malaria which are still obscure.

Amongst these investigations I must mention those which Colonel James has carried out in England on *induced malaria for the treatment of certain nervous diseases*. This memorandum (document C.H.,/Malaria/57 (1)) is worthy of attention not only from the pathogenic point of view, but also on account of the light it sheds upon the conditions which must exist for the anopheles to become infected.

In England the official regulations forbid the direct inoculation with blood infected with malaria for the treatment of the first of a series of patients suffering from mental affections. Consequently recourse must be had to the bite of infected mosquitoes.

As the result of his numerous observations, the author explains *how difficult it is, under the most favourable conditions, to bring even a few members of a large brood of mosquitoes to a condition in which they will be successful transmitters of malaria.*

In consequence, he has studied the factors which might explain this difficulty :

1. In the first place it is not easy to find one amongst the patients who is a "good infector" of mosquitoes. A patient in a primary attack does not become infectious until ten days have elapsed from the beginning of his illness.

2. Many oöcysts in the stomach of a mosquito do not develop at all. That is why the anopheles does not become infective until it has bitten an infectious patient several times. Therefore the author allows the mosquitoes to bite the malarial patient at least seven times.

3. There are mechanical factors (growth of the ovaries) or chemical factors (feeding upon certain fruits) which prevent the anopheles from becoming infected.

4. The probable length of life of the mosquito plays a very important part in the development of the infection.

All these factors explain why even in very malarial countries only a small percentage of the mosquitoes is found to be infected.

But how is the other epidemiological observation to be explained, that in certain districts — despite the very low proportion of infected anopheles — the great majority of inhabitants is found to be suffering from malaria ?

The author replies to this question by explaining that a mosquito which has succeeded in becoming infective retains its power of infection for a long period. Several batches of infected anopheles lived and continued to be infective, says the author, for periods ranging from one month to three months after the date on which sporozoïtes were present in their salivary glands. Some of the mosquitoes, after biting between 30 and 40 patients, still had numerous sporozoïtes in their glands, because these glands were replenished with new sporozoïtes in proportion as the oöcysts in the stomach of the insect ripened.

This persistence of infectivity, coupled with the author's observation on the resistance of oöcysts and of sporozoïtes to cold, led him to the conclusion that the agent of benign tertian malaria can, for example, be maintained alive even through a severe winter in hibernating mosquitoes. This explains the occurrence of cases of tertian malaria in Northern Europe during winter or at the beginning of spring.

The author concludes that the following factors contribute towards spring malaria :

(*a*) The persistence of infective power of hibernating mosquitoes ;

(*b*) Relapses among human patients ;

(*c*) The possibility that infection contracted in autumn may remain latent during winter and only become active in spring.

The author hopes shortly to produce proofs based upon laboratory experiments in order to confirm this theory.

* * *

This shows the great importance of these observations, which shed a new light upon certain corollaries of the anti-malarial campaign, such, for example, as the necessity for the campaign against hibernating insects. If this part of the campaign were neglected, the whole of the anti-larval measures would be made practically useless, as the door would be left open to the most dangerous source of infection. The necessity of early treatment is obvious, specially as regards children, since it would make it impossible for mosquitoes to become infected and to transmit the disease (infection of the mosquitoes being possible only after the tenth day of the disease in the human being).

Colonel James' investigations have been followed with the liveliest interest by the Commission. As the author has expressed the wish that a similar plan of work should be applied in other countries, certain members of the Commission will shortly proceed separately to London to see for themselves the procedure and the technique of the experiments.

Moreover, treatment by induced malaria, which is being more and more generally applied in the case of nervous diseases, has suggested (see Appendix) to the Malaria Commission (upon Professor Pittaluga's proposal) to recommend the following measures :

(*a*) Inoculation with malaria by means of the bite of an anopheles mosquito infected by an unmixed strain of plasmodidæ previously determined by laboratory examination.

(*b*) Establishment of close relations between the clinical services and the laboratory.

* * *

Other very important investigations are at present being carried out by Professor Nocht at the Hamburg Institute of Tropical Diseases. They refer to :

(*a*) The distribution of sporozoïtes in the infected anopheles ;

(*b*) The biology of the microgametocytes in circulating blood ;

(*c*) The pathogenesis of malarial hemoglobinuria.

With regard to this last point, Professor Nocht gave a lecture before the Rome Congress on the provisional results of his investigations ; so far as I know, this lecture has not yet been published. The author hopes to be able to publish in a few weeks a final and detailed report on this interesting subject.

Work on the two other questions is not yet sufficiently advanced to be published.

* * *

Professor Ottolenghi, at Bologna, states that, as a parallel to Colonel James' investigations, he is examining the conditions necessary for the infection of anopheles.

* * *

The following work is being carried out in Professor Cantacuzène's laboratory at Bucharest :

(*a*) Professor Zotta has been studying for some time the distribution of sporozoïtes in the infected anopheles (the same question that is being studied at Hamburg).

(*b*) Professor Zotta has carried out observations on the hibernation under ice in ponds in certain districts of larvæ bred in the autumn. The hibernation is interesting. There remains to be seen whether the phenomenon is general.

(*c*) Investigations of the variation of the infective power of the *Anopheles maculipennis* in relation to the saltness of the breeding-places.

Professor Swellengrebel is investigating the following two questions :

1. Does a morphological and biological difference exist :

(*a*) Between the *Anopheles maculipennis* from fresh water and from salt water districts ;

(*b*) Between those from malarial and healthy areas ?

2. Does the draining of marshy land or of large stretches of water near the sea exercise any influence upon the degree of saltness of the waters in the neighbouring areas, *i.e.*, does it decrease this saltness ?

Is it owing to this fact that such drainage works have contributed to the decrease of the incidence of malaria in the coastal districts of the Netherlands ?

In order to be able to reply to this last question it is essential, according to the author, first to consider the following two problems :

(*a*) Has the frequency of malaria in Holland really decreased ?

(*b*) Are there any reasons for attributing the cause of this decrease (if it exists) to these drainage works rather than to other causes ?

This is an extensive investigation which demands a complete and critical revision of all previous ideas on the history of malaria in Holland. The author has been studying this vast problem for two years, and he does not as yet anticipate an early conclusion of his work.

* * *

Professor Marchoux, in his laboratory at the Pasteur Institute, continues to study the clinical progress of attacks of fever induced by a certain species of parasite in an environment where there is no fear of reinfection with a view to determining the importance of the strains in relation to the gravity of the morbid phenomena.

Professor Marchoux is devoting special attention to the study of the therapeutics of malaria by means of a substance likely to be more effective than quinine against the various forms of hæmatozoa.

* * *

Some considerable time will still be required for all the researches which I have just enumerated. They are proof of the constant interest taken by the Commission in the solution of the different aspects of the malaria problem.

IV. Continuation of Investigations regarding Large "Bonifications".

The study of the value of large "bonifications" has now reached the stage of practical application.

An experimental station has already been set up at Ferrara for the study of malaria in the "Grandi Bonifiche" under the direction of Professor Ottolenghi and subsidised by the Directorate of the Italian Health Department and by the Rockefeller Foundation. The University of Ferrara has provisionally placed at the disposal of this station the necessary buildings, scientific installations and medical and subaltern staff. Three survey areas were chosen during the winter and early spring. La Mesola — an area which is at present almost throughout infected with malaria ; Iolanda di Savoia — an area completely sanitated ; and Diamantina — an area in which all sanitation works have been completed but where the success of this work seems doubtful.

The most minute investigations are being carried out at present in order to determine definitely the areas to be surveyed, and to ascertain the value of the different local factors governing endemic malaria.

On the other hand, Professor Swellengrebel, who is carrying out a similar survey for the polders in the Netherlands, has drawn up a programme in two sections :

I. What influence have the polders exercised in the past upon malaria ? It is essential to know this since present experience covers too limited a period to enable the real value of the polders from the sanitary point of view to be gauged.

II. What is the action exercised by the polders :

(*a*) While still in process of formation,

(*b*) When completely formed,

1. Upon general health ?
2. Upon malaria ?

The above factors must be considered both from the point of view of their economic influence and of the changes they cause in winter conditions which might influence anophilism.

The above gives in its broad outlines the programme now being carried out in Holland.

Secondary Alkaloids.

The countries selected for experiments are Italy, Kingdom of the Serbs, Croats and Slovenes, Spain, Roumania and Algeria.

A circular letter, dated January 9th, 1925, was despatched by the Medical Director to the Health Departments of these five countries in order to obtain the help of certain hospitals and medical clinics for the experiments.

A special Sub-Committee consisting of Professors Nocht (Chairman), Ottolenghi, Pittaluga, Cantacuzène, and Dr. Raynaud was appointed. This Sub-Committee was to get into touch with the health departments of the countries selected, and through the latter with the officials entrusted with the direction and execution of the experiments in question.

Reports have already been received from :

(*a*) Spain (centres of investigation : three dispensaries in three different provinces).

(*b*) Kingdom of the Serbs, Croats and Slovenes (Institute of Tropical Diseases at Skoplje ; military hospital at Bitolje ; institute at Trogir).

(*c*) Roumania (hospital in Jassy ; hospitals in Galatz).

(*d*) Italy (medical clinic of the Royal University at Rome ; preliminary note).

In Algeria, the rainfall has been so scanty this year that there was practically no malaria and no experiments could therefore be carried out.

Preparations employed in the Experiments.

Spain : Experiments were carried out with cinchonine sulph. from the Italian "State Quinine Laboratory".

Kingdom of the Serbs, Croats and Slovenes : Hydrochlorate of cinchonine, quinetum, cinchonidine, in comparison with hydrochlorate of quinine. Place of origin : the Amsterdam factories, excepting the cinchonine sulphate sent by the Turin laboratory.

Roumania : Hydrochlorate of cinchonine and quinetum (made up according to the following formula : quinine 15 per cent, cinchonidine 35 per cent, cinchonine 25 per cent, quinidina 5 per cent, quinoïdin 20 per cent), from the Amsterdam factories ; the cinchonine sulphate from Italy and the bichlorhydrate of quinine from Germany.

Italy : Cinchonine ; quinidina ; quinetum and, for purposes of verification, quinine. These drugs were of Dutch origin.

V. Posology.

In Spain : One gramme taken through the mouth in two doses per day.

In the Kingdom of the Serbs, Croats and Slovenes : Doses in proportion to the weight of the body. For a man weighing 70 kilos : one gramme in two doses in a chlorhydric solution.

In Roumania : The same doses as in the Kingdom of the Serbs, Croats and Slovenes.

In Italy : Stronger doses (from 1 gr. to 2.50 gr. per day, in doses of 0.50 gr).

Duration of Treatment.

In Spain and in Roumania : ten days.

In the Kingdom of the Serbs, Croats and Slovenes : five days.

Hæmatological Examination.

A hæmatological examination was generally carried out. The blood was taken twice a day, morning and evening, before and after each dose of medicine. Each examination included from two to three thick drops and one film.

Clinical Examination.

Everywhere the medical history of the patients was carefully ascertained and a chart of the temperature curves drawn up.

Urine Analysis.

Cytological and chemical examination of the urine. Albumen was never found except in cases of intercurrent diseases (scarlet fever : Roumania). Even in those cases the treatment did not aggravate the nephritis.

Number of Patients Treated.

(*a*) In Spain :	
Cases of tertian	36
Cases of quartan	2
Cases of tropical	10
Mixed forms (tertian and quartan)	3
Total	51
(*b*) In the Kingdom of the Serbs, Croats and Slovenes :	
Cases of tertian	89
Cases of quartan	1
Cases of tropical	73
Total	163
(*c*) In Roumania :	
Cases of tertian	148
Cases of quartan	6
Cases of tropical	233
Mixed forms	15
Total	405

The distribution of the cases treated in Roumania according to the preparation employed is as follows :

	Number of Patients
Cases treated with quinetum	110
Cases treated with sulphate of cinchonine	98
Cases treated with chlorhydrate of cinchonine	99
Cases treated with bichlorhydrate of quinine	98
Total	405

Results of the Treatment.

A. *Spain.*

Out of 36 cases of tertian malaria the examination of the blood gave a negative result as regards schizontes :

On the second day of treatment in	12 cases
On the third » » »	20 »
On the fourth » » »	4 »

Out of two cases of quartan the examination of the blood gave negative results :

On the fifth day of treatment in	1 case
On the tenth » » »	1 »

Out of ten cases of tropical the examination of the blood gave a negative result :

On the third day of treatment in	1 case
On the fourth » » »	1 »
On the fifth » » »	2 cases

The other six cases remained positive with a large number of parasites (schizontes and gametocytes) after ten days' treatment.

These results would tend to show that cinchonine, which is fairly efficacious in cases of tertian and quartan, has only a slight effect in cases of tropical, where in a large majority of cases the parasites resist its action.

B. *Kingdom of the Serbs, Croats and Slovenes.*

In cases of tertian malaria chlorhydrate of quinine has a definite effect on the schizontes and gametes. The effect of quinetum is about the same. Cinchonine has a much weaker action.

In cases of tropical malaria quinine and quinetum have an equal effect upon the schizontes. On the other hand, their effect upon the gametes is only slight. In comparison with these two drugs, the action of cinchonine is decidedly weaker, both on the schizontes and gametes.

C. *Roumania.*

Numerous observations show :

1. That there is a parallel between the efficacy of quinetum and of quinine in regard to the schizontes of tertian malaria. This degree of efficacy is also fairly high in regard to the gametocytes of tertian malaria.

In tropical malaria quinetum and quinine are still very effective against trophozoïtes, but considerably less so against gamètocytes.

2. Hydrochlorate and sulphate of cinchonine are less effective than the other drugs. This difference is well marked in regard to the gametocytes of tertian malaria and still more pronounced as regards the trophozoïtes of tropical malaria.

D. *Italy.*

As I have already mentioned, there is so far only a preparatory note on the experiments in Italy. The following general conclusions may, however, be drawn therefrom :

1. The maximum effect is exercised by quinine in all cases.

2. Quinetum ranks next to quinine from the point of view of efficacy.

3. Quinidina has proved itself very active, even in smaller doses than quinine.

4. Cinchonine, on the other hand, has proved less effective than quinine.

* * *

The results, a summary of which has just been given, cannot, of course, be considered final. It cannot even be said that these data are strictly comparable with each other, since the same methods of experiment have not in every case been applied.

The results mentioned, nevertheless, make a remarkable contribution to our knowledge of the action exercised by quinquina alkaloids upon the different forms of malarial infection. From this point of view, the results obtained in the different countries strikingly confirm each other.

As regards the degree of efficacity, it would appear that first place must be given to quinine.

Quinetum, the formula of which has been given above, occupies the same rank.

Second place — but considerably lower in the scale — must be given to cinchonine. Its inferiority is most marked in connection with the summer and autumnal forms of malaria.

Medium and split doses are more efficacious than strong and large doses. The alkaloids used produced unpleasant symptoms only in a negligible number of cases. The temporary disturbances which were noted were the result mainly of large doses.

These investigations, so auspiciously begun, will be continued.

VI. Studies in Malariology.

A. *Courses for specialists :*

After the last session of the Committee, the Health Section entered into communication with Professors Balfour, Brumpt and Nocht, in order to obtain the programmes of theoretical courses which might be given this year in their respective institutes. Upon receipt of the replies, the Secretariat at once drew up a programme in pamphlet form, printed in French, English and German, which was sent to the Health Departments of the countries interested in anti-malarial work for the purpose of recruiting students ; to the Ministries for the Colonies of certain countries ; to Universities, and to military and naval schools of medicine.

The courses will take place in May, June and July in London, Paris and Hamburg, and will last thirty days. The curriculum, which is practically identical in the three Institutes, is divided into five chief headings : Hæmatology, Protozoology, Entomology, Clinical work, Prophylaxis.

Upon the conclusion of these theoretical courses on malaria, the students will have to carry out practical work in the anti-malarial stations : Bastia (Professor Brumpt) ; Italy (Drs. Hackett and Ottolenghi) ; Kingdom of the Serbs, Croats and Slovenes (under the instructions of Dr. Stampar) ; Spain (Professor Pittaluga).

The Commission's budget does not provide for any credits to help young doctors to attend these courses. On the other hand, the Rockefeller Foundation has granted scholarships to a certain number of candidates of its own selection.

B. *Practical Courses for Malaria Specialists.*

In accordance with the Committee's decision, a second type of "scholarship" has been provided for malaria specialists who are in charge of anti-malarial measures in their own country.

According to the resolutions adopted, the programme will consist of a short term at one or more laboratories, and later of a period of two or three months devoted to studying in a malarial country the solutions given there to the different problems presented by malaria.

The budget of the Malaria Commission provides the necessary funds for this second type of scholarship.

The Health Section has approached Professors Pittaluga, Swellengrebel and Ottolenghi on this subject.

VII. Study of the Connection Between Malaria and Climatic and Meteorological Conditions.

The influence of climatic and meteorological conditions upon the incidence of malaria is known to be very marked. Temperature and humidity exercise the greatest influence upon the life of the mosquitoes and the development of the parasite in the body of the anopheles.

Some people even go so far as to assert that it is possible under certain circumstances to deduce from meteorological facts what the incidence and severity of malarial infection will be in a given country during the following season.

The relation between the two classes of factors must now be systematically studied — meteorological and climatic factors on the one hand, and epidemiological on the other. The Commission is of opinion that for the moment the two stations carrying out research work on large "bonification" could undertake this work — Ferrara (Ottolenghi) and the Netherlands (Swellengrebel). The Rockefeller Foundation stations in Italy possess a small installation for meteorological work, which might be used for these investigations.

The meteorological stations in those countries should receive from these observation centres information on the climatic and meteorological conditions over a wide area.

In the areas under investigation the medical practitioners and medical officers of health should forward to the centres where these investigations are carried out the notifications of diseases with the necessary particulars (in the case of malaria : first attacks, relapses, recurrent attacks ; clinical aspect, convalescence, death, etc.).

Between the two fields of research, climatological and epidemiological, there is another to be considered — that of the local forms of anopheles. A study of the malarial climatology and epidemiology should include the minute and prolonged observation of the development of the parasite and of the development of the mosquito under the influence of climatic and meteorological variations, etc.

For these reasons the Commission proposes to ask the two stations studying large "bonifications" to examine these questions.

For this purpose Professor Pittaluga has offered the help of the Tortosa Observatory, situated close to the delta of the Ebro.

This is broadly the programme under consideration.

VIII. Final Report on Europe.

Following the procedure which had been adopted for the drawing up of the report on the tour in Eastern Europe in 1924, the Malaria Commission decided at its session of April 27th to appoint a Drafting Committee, composed of Professor Nocht (Chairman), Professor Pittaluga and Colonel James, to draw up the general plan and draft the conclusions of the final report which should summarise the collective results of malaria research in Europe during the three years the Commission has been at work. This Drafting Committee will meet in London in June. The final report on Europe will be ready for submission to the Health Committee at its autumn session.

IX. Malariological Glossary.

The advantage of defining, fixing and standardising the technical terms and expressions employed by the Commission in its reports has frequently been pointed out ; while the study of malariology is being advanced everywhere, there is not as yet complete agreement regarding the meaning of certain terms currently used in technical language.

With a view to collecting the necessary data, the Health Section has forwarded a circular letter to all its members, experts and correspondents requesting them to state the terms, scientific or local, which they desire to have included in the glossary in order that they may be communicated to Professor Marchoux, who has consented to work out this scheme. This circular letter recalls that in order to make students familiar with the sanitation works which are being carried out in various countries, Professor Marchoux has proposed that a set of lantern slides showing the various aspects of the anti-malarial campaign should be collected at Geneva by the Health Section. These lantern slides would be placed at the disposal of any scientists or institutes who desire to use them for purposes of instruction or propaganda.

Appendix.

The Malaria Commission :

Considering the extent to which in certain countries the treatment by induced malaria of certain nervous disorders, of general paralysis in particular, is being applied ;

Considering that unless it is carefully controlled, both from the clinical point of view and from the point of view of laboratory examination, specially with reference to the kind of virus used, this method of treatment is liable to cause accidents, which are sometimes serious;

Considering also the desirability, from the scientific point of view, of establishing close co-operation between malariologists and medical practitioners, especially psychiatrists, in everything connected with the use of malaria virus as a therapeutic agent ;

Recommends that the Health Committee should forward to the Health Administrations concerned a circular letter drawing their attention to the foregoing considerations and pointing out that, on the basis of the information which has reached the Committee to date, it would be desirable that, in the application of the treatment by induced malaria to certain mental diseases, the following principles should be borne in mind :

(1) The first case at least of a series of patients to be treated should be inoculated with the bite of an anopheles infected with an unmixed strain of plasmodes previously determined by examination in a laboratory ;

(2) Close contact should be established between the clinical services and the malariologists so as to enable the latter to give the medical practitioners reliable information on the nature of the virus they propose to use.

C.H. 466.

Annex 85.

PRELIMINARY REPORT ON THE PROBLEM OF LEPROSY

submitted by Professor CHAGAS.

Leprosy is a medico-social subject which demands the attention of the Health Committee of the League of Nations in order that the co-operation of all civilised countries may be obtained in combating this terrible scourge.

This disease is prevalent over vast areas of the globe ; in certain countries it has an acutely endemic character and threatens to spread from its present centres to areas which have hitherto been immune. Moreover, leprosy is one of those diseases which make a special appeal to human pity, because the wretched leper is a being shunned by society and an outcast, an object of pity and fear, condemned to a life of pain and afflicted with untold misery. Some nations undoubtedly make great efforts to combat leprosy and do all that they can to restrict its ravages and prevent its spread ; it must be said, however, that all countries do not devote sufficient attention to the problem, and that, in certain leprosy centres, the necessary technical resources for effective prophylaxis are lacking.

Some selection must be made among the methods of combating the disease in order that these methods may be grouped in a coherent whole and embodied in a general plan which can be recommended and adopted in all countries in which leprosy exists. It is particularly important that all highly civilised countries should give their help in order to deliver humanity from the great agency of suffering and death constituted by leprosy.

Every part of the world except Europe has leprosy centres, some of them being particularly virulent. Even the countries of Europe, however, must take part in the campaign against this disease, not only from considerations of international solidarity, but because a number of them have virulent centres of leprosy in their colonies, and because these colonies look to the mother-country for help and protection. Moreover, the problem has a definitely international character, owing to the danger which is always to be feared of the disease spreading from districts where it at present prevails to others which are still exempt.

The Committee has concentrated specially on the problems of tuberculosis, cancer and malaria, for, these diseases being universal, every country must co-operate in restricting their ravages. The work hitherto done by the special commissions of the Health Committee represents an achievement of the greatest value, and has been profitable to every country ; but our international duties require that leprosy should also receive the special attention of the Committee, in order that certain important aspects of the epidemiology, treatment and prophylaxis of this terrible disease may be thoroughly investigated. It is essential to take action of this sort : first, because leprosy is rife over large areas of the globe and has a high rate of morbidity ; and, secondly, because this disease can occur in all climates and latitudes, and at all altitudes, and is therefore always threatening to invade countries as yet uninfected.

Leprosy claims numerous victims in Africa, Asia and America. Furthermore, in certain districts of these continents, the disease is one of the principal causes of the physical deterioration of the individual ; it therefore constitutes not only an important health problem, but a grave economic problem.

The statistical data given below, which show the incidence of leprosy in a large number of countries, bear witness to the wide area affected by the disease. Although Europe itself seems to be little affected, the same is not the case with the colonies.

Over and above the humanitarian aspect of the question and the duty of international solidarity which devolves upon the European nations, we must bear in mind that the problem has become more serious from the practical point of view as a result of the present facility of communication between the various countries of the world, which tends to create permanent contact between infected areas and those which have remained immune. Colonising

nations are continually receiving from their colonies natives who come to the home country for treatment, or nationals who return infected to their native land. Moreover, lepers throughout the whole world come to the great scientific centres in the hope of being cured. As a result of this continual movement of infected persons, leprosy may be introduced into countries which are still immune, and even fresh foci created in those in which the disease was still almost unknown. The danger of infection in these circumstances requires international health regulations capable of preventing the spread of the disease. The exceptional interest of the problem of leprosy, moreover, was brought out during the three international conferences on this subject which met in Europe ; the first, at Berlin, on the initiative of the German Government, the second at Bergen, under the auspices of the Norwegian Government and the third at Strasburg, under the patronage of the French Government. Further, on the initiative of the Brazilian Government, the first American Conference on Leprosy met at Rio de Janeiro in 1922, when all the countries of the New World were represented. More recently still, the Paris Académie de Médecine, as a result of a communication from Professor Jeanselme with regard to a case of native leprosy reported in that city, resolved to instruct its "Leprosy Commission" to inaugurate measures to prevent the spread of the disease in France.

As evidence of the worldwide importance of the problem of leprosy, we will quote a few statistics concerning more particularly the colonies of European countries, official information and memoranda submitted to the most recent conferences.

According to the data supplied by Marcel Leger and quoted by Gougion, Medical Inspector-General of the Colonial Health Service, leprosy exists, generally speaking, as an endemic disease in all French colonies. The number of lepers under French colonial rule may be estimated at 80,000. Gougion considers that, for the French colonies taken as a whole, the incidence of leprosy is from 0.50 to 2 cases per 1,000 inhabitants. In certain colonies the figure is 10 and even 30 per 1,000.

In certain islands of the Caledonian Archipelago, the rate of leper morbidity amounts to 1.67 and 2.54 per cent. A total number of 5,000 lepers in a population of from 2 to 3 millions is frequently to be found in the statistics given by this author.

According to Sir Leonard Roger, the greatest centre of leprosy in the world is in Central Africa, where the proportion of lepers is 60 per thousand in the southern part of the Cameroons, 200 per thousand in several parts of the Belgian Congo and 320 per thousand in certain districts of French Guinea.

In India, according to the 1921 census, there were 102,503 lepers, and in China, where it is not yet possible to take a regular census, the number of lepers has been estimated at over 100,000.

According to the report of Dr. Alilsuda, Director of the Tokyo Leper Hospital, which was submitted to the last International Conference on Leprosy, there appear to be 16,261 lepers in Japan.

Jeanselme calculates that in Indo-China there are 25,000 lepers. Engel Bey estimates that there are 3,000 lepers in Egypt, and Riper that there are from 3,000 to 4,000 in East Africa.

The number of lepers in the various countries of America is high, and it may be said that very few American Republics are free from the disease. According to the data submitted at the last conferences the number of lepers in the New World may be estimated at between 30,000 and 40,000, the vast majority of these being in South America. It should be observed that this figure would be much higher if the censuses were absolutely complete.

Official statistics have already shown that there are nearly 11,000 cases in Brazil and we think that more careful enquiries would prove the number to be still greater.

In Oceania, apart perhaps from Australia and New Zealand, all the islands are more or less affected with leprosy. In some, indeed, the number of victims is considerable, for instance, in the Philippines, in which Wade, in 1923, counted 5,232 lepers, and Java, where Ehlers and Verdin estimated the number of lepers at 4,443 in 1902.

To take a census of lepers is, at any rate in South America, a very difficult task. There are vast areas with no means of communication, inhabited by uncivilised or only slightly civilised races, among whom it is very difficult to obtain the required information. Moreover, it is not always easy by means of a rapid examination to diagnose cases of this disease when the symptoms are often far from clear. It is therefore certain that the above figures are smaller than they should be, and yet they show how high is the proportion of lepers in many countries.

Europe, which is freer from the disease than other parts of the world, nevertheless possesses several centres some of which are fairly important. In France, in the Maritime Alps, Dr. Bonnet discovered 59 cases, and in Norway the last census shows that there were 130. In 1907 there were 89 lepers in Sweden, 226 in Lithuania and 219 in Esthonia. There are various centres in European Russia, particularly in the Baltic provinces, where, according to the report of Professor Ivanow and Dr. Mamouw, 1,026 cases of leprosy were recorded between 1902 and 1909.

In Spain, according to Vello's statistics, which were submitted to the Bergen Conference, there were 522 lepers. Awide and Mendoza, however, estimate at 1,500 the number of cases known, scattered mainly throughout Galicia, Valencia and Andalusia.

In Italy, according to Bordoni Uffreduzzi (Bergen Conference) there must be at least 150 lepers in Continental Italy alone.

In Bosnia-Herzegovina there were in 1909, 393 cases according to Kobrel and in Roumania according to data furnished by Dr. Stefanesco, Director of the Sulina laboratory, there were 533 lepers.

In Turkey there are many cases ; according to Düring, there must be 500 lepers in Constantinople alone. Sheridan Gavale estimated at 200 the number of cases in Greece, while in Crete Ehlers and Conheim discovered 378.

Apart from lepers inhabiting these centres, a few imported cases are found in Europe, mainly in seaports which regularly trade with the East, as for instance Marseilles, Bordeaux and Hamburg. Moreover, in the great centres of science, there are a considerable number of lepers who come to undergo treatment. Jeanselme estimates that there must be 200 lepers at liberty in Paris, seeing that 104 were received at the Hôpital St. Louis from 1910 to 1925.

Marchoux, who is universally recognised as an authority in the matter, holds that leprosy, although it has not disappeared in Europe — since cases occur in every country — is apparently dying out, though he wisely qualifies this statement by saying : "It is to be expected that this disease will finally disappear, provided however the numerous cases of foreign origin which are becoming increasingly common do not revive moribund centres and create new ones". Jeanselme, in his report to the Académie de Médecine on the prophylaxis of leprosy, considers that imported leprosy is far more dangerous than the native variety. In order to avoid the danger of such importation, Germany in 1901 signed with Persia, Roumania, Russia and Turkey a convention prohibiting the entry of lepers from these countries. An agreement concluded between Germany and Austria laid down that information should be exchanged regarding the occurrence of communicable diseases — including leprosy — in the frontier districts between the two countries.

In the report of the Leprosy Commission of the Paris Académie de Médecine, the possibility of contracting the disease from imported cases, in countries free from leprosy, is proved. The 123 lepers observed in Paris by Jeanselme came for the most part from Central or South America, New Caledonia and Indo-China.

The cases of leprosy observed in the main centres and several large ports do not, properly speaking, constitute centres of the disease, but they may nevertheless help to spread it. Jeanselme's report includes a case in which a young Parisian had been infected by his father, who had contracted leprosy in the colonies.

Other cases of contagion are reported by Lunde, Perrin, Proaff and Wolff ; in England by Benson and MacLeod, and in Holland by Mendes da Costa and Broers ; in Italy by Monlegazza, Bertarelli and Breda ; in Spain by Azua.

These eighteen observations amply prove that exotic leprosy coming from virulent centres does not lose its infectious character in Western Europe. The importance of the problem of leprosy is therefore obvious.

It deserves the attention of all Governments whatever may be the condition of the population in regard to this disease and from whatever point of view they may regard the matter.

The international conferences on leprosy which have been held up to the present have greatly contributed to the progress of the study of this disease. Not only have these conferences furnished information on the incidence of leprosy in the various countries, but they have made it possible to lay down the main lines for conducting an effective modern campaign against the disease. Greater co-ordination in the efforts of all nations is, however, necessary ; and this, I think, is the action which the Committee should have in view. International co-operation should be stimulated in order that the problem may be entirely solved.

The general action to be taken by the Health Committee might be as follows :

I. To spread, in the main centres of leprosy, modern knowledge regarding the disease, in order that measures may be taken which will effectively restrict infection.

II. To promote and assist investigation into the treatment of leprosy.

III. To endeavour, with the aid of specialists, to elucidate the mechanism of infection, an exact knowledge of which is indispensable as a rational basis for prophylaxis.

IV. To arrange for the exchange of specialists between countries in which leprosy exists, and organise special leprosy research centres.

V. To promote and assist the publication of an international review, the special purpose of which would be to spread knowledge concerning leprosy.

VI. To promote international legislation with the object of preventing the transmission of leprosy from one country to others.

In order to carry out this programme, I am of opinion that the Health Committee should set up a special commission to study the problem of leprosy in all its aspects.

C.H. 424.

Annex 86

REPORT BY THE MEDICAL DIRECTOR ON THE WORK ACCOMPLISHED SINCE THE FIFTH SESSION OF THE COMMITTEE

(October 1925 - April 1926)

I. I had the honour to circulate to the Committee the report by Viscount Ishii on the work of the fifth session of the Health Committee. On his proposal, the Council "congratulated the Health Committee on the real progress made towards the solution of many problems

of importance to international public health and on the noteworthy accomplishments whereby international co-operation in public health had been secured and strengthened". The Council formally approved all the resolutions adopted by the Committee.

I also communicated to all the members the provisional budget estimates for 1927, which are being submitted to the April session of the Committee for its approval (Annex 99).

I have further communicated to the members a special report on my voyage to the Far East (Annex 81).

II. *Notes of the Section on the Studies entrusted to it at the October Session of the Committee.* — The Committee studied at its October session the proposals of the Sixth Assembly and resolved to refer to the Health Section the preliminary studies of certain questions. I have prepared short notes on the work done in regard to :

1. The study of the relations actually established or capable of being established between the insurance medical services and the public health services for the better prevention of disease (Annex 87).

2. The collection of information as to how hospital records can be utilised as notifications of morbidity (Annex 88).

3. The preliminary information collected for a study of the control of the manufacture and distribution of food supplies in the interests of international public health (Annex 89)

4. A preliminary report on infant mortality and related subjects (Annex 90).

5. Enquiry as to the desirability and practicability of establishing a Sanitary Bureau for the countries on the West Coast of Africa (Annex 91).

6. The action arising out of proposals received from interested countries concerning the despatch of an expert medical statistician to study statistical methodology, etc. (Annex 92)

I have prepared a special report on the question of the revision of the International List of the Causes of Death.

III. *Reports to be presented by Members of the Committee in accordance with the Resolutions of the October Session.* — The Committee will, in accordance with its resolution, receive from Dr. Lutrario and Dr. Jitta a report on the Prevalence of Trachoma and the measures adopted in various countries for its prevention. Dr. Pittaluga will submit the progress report on his study of Leishmaniosis. Dr. Chagas will, it is hoped, present a note on Leprosy and on Disinfection. The report of Professor Leon Bernard on Measles will be ready for the next session of the Committee ; and Professor Cantacuzène desires to submit his memorandum on Scarlet-Fever during the autumn session.

IV. *The Work of the Commissions submitted to the April Session of the Committee.* — The President of the Malaria Commission is reporting on the work done by its members since the last session.

The President of the Commission on Questions relating to the Epidemiology of Smallpox is presenting a note on the session of the Commission held at The Hague in January last and on the work now in progress at the different centres.

The President of the Tuberculosis Commission is presenting an exhaustive report by Professor Calmette on the Standardisation of Tuberculin, based on the experimental work undertaken on behalf of the Committee.

Dr. Raynaud is presenting a report on the results of the Interchange of Port Health Officers of the Mediterranean area.

V. *Departmental Work of the Health Section.* — In accordance with the resolutions of the Committee, the Section has prepared an annual report on the period from January 1st to December 31st, 1925. I regret that it was not possible to present this report during the first two months of the year.

The departmental work of the Health Section may be classified under the following headings :

1. The Service of Epidemiological Intelligence and Public Health Statistics, including the Work of the Singapore Bureau (Annex 95).

2. Interchanges of Public Health Personnel (Annex 96).

3. Special Studies and Investigations.

The Committee may find it convenient to have each of the three branches of work referred to in special brief notes.

I have included under the heading of "Special Studies" the reports on the proposals of the Assembly referred to under paragraph II.

VI. I am submitting to the Committee various invitations to be represented at several International and National Conferences, as well as the proposal to hold an International Conference of the Directors of Hydrophobia Institutes.

Annex 87.

SPECIAL STUDIES.

Public Health Administration and Health Insurance.

During the October 1925 session, the Health Committee adopted the following resolution :

"The Health Committee,

"Having studied the first of the proposals of the Czechoslovak delegation to the Sixth Assembly, considers :

"That, while continuing to collect and publish summarised information regarding the organisation and administration of the sanitary services of different countries, it is also desirable (after consultation with the Czechoslovak authorities interested) to undertake a study of systems of social insurance against disease in different countries, whether established by private initiative, workmen's associations or by the State. This study in particular should include :

"(*a*) The relations actually established or capable of being established between the insurance medical service and the public health service with a view to the better prevention of disease ; and

"(*b*) The nature of the principal financial considerations involved.

"It should be carried out as far as may be necessary in consultation with the International Labour Office."

I. In pursuance of this resolution, the competent authorities of the Czechoslovak Government were consulted on this subject. A new law was passed by the Czechoslovak Legislature in 1924 providing for a general system of insurance against sickness, invalidity and old age and for the organisation of a central insurance institution formed by taking over and amalgamating the existing sickness funds. The new law takes effect in July 1926, and the officials concerned wish to take advantage of the experience acquired by other countries with regard to the organisation of the medical services and the establishment and extension of preventive measures.

II. In order to meet the wishes of the Czechoslovak authorities and in pursuance of the terms of the resolution adopted by the Health Committee, the chiefs of the public health services of Austria, Czechoslovakia, Germany, Hungary and Poland were consulted and agreed to commission one of their public health officers to carry on studies of public health administration and health insurance in a large city of each of the countries listed. Accordingly reports will be prepared on :

Warsaw, by Dr. Chodzko ;
Prague, by Dr. Riha ;
Budapest, by Dr. Gortvay ;
Vienna, by Dr. Foramitti ;
Cologne, by Dr. Savels.

At Prague, a committee has been set up to assist in the study, consisting of representatives of the ministries and departments concerned.

III. These public health officers met at Prague on March 18th, 19th and 20th to discuss the method of study and to give an account of the public health work of health insurance organisations in the countries represented. Representatives of the Ministries of Public Health and Social Welfare of Czechoslovakia were present. A plan was adopted providing for the division of the study into three parts :

(*a*) Health insurance, with particular reference to the medical services ;

(*b*) Public health administration, including the work of official and voluntary health agencies ;

(*c*) Hospitals, which are related to health insurance on the one hand and to the public health services on the other.

The plan which was prepared, with the assistance of the public health officers present' is too detailed for reproduction here but is available to any member of the Health Committee who may be interested.

The collection of the data necessary to carry out this plan is expected to take about three months, when another conference of the public health officers concerned will be held. The results of this preliminary enquiry should serve as a guide for the pursuance of the study in these and other cities to which the enquiry may be extended, especially in Denmark, Holland and Belgium. A full report should be available for the October session of the Health Committee.

IV. Germany was a pioneer in the field of social insurance, and her system has developed along different lines in the various insurance districts. Furthermore, measures for the prevention of disease have been adopted by many of the health insurance organisations, and for these reasons particular interest should attach to a report on the preventive aspects of health insurance in Germany as a whole now being prepared for the Health Section by Professor Grotjahn, of the Hygienic Institute of the University of Berlin.

V. The enquiry in the five cities mentioned includes a study of the morbidity records of hospitals and health insurance organisations in order to determine what reliance can be placed on such records as an index of the prevalence of certain preventable diseases in the community, supplementing the less complete information furnished by mortality returns. After a certain amount of preliminary study, the health officials charged with the investigation in the different cities will meet to exchange views on this subject as well as on the results of the whole enquiry.

VI. The competent officials of the International Labour Office have been consulted from time to time on the scope and character of the enquiry.

C.H. 418.

Annex 88.

SPECIAL STUDIES.

Morbidity Statistics.

Reference to the proposed enquiry regarding morbidity statistics will be found in the note dealing with the health insurance investigations.

It is also proposed that the statistical study tour of 1926 should investigate this subject. For this study tour it is hoped that the assistance of a maximum number of nine expert statisticians will be obtained, each from a different country and each with experience of hospital or other morbidity statistics. Each participant will be asked to prepare a memorandum describing any progress made in his respective country in systematising and utilising hospital and dispensary records as indications of morbidity ; these memoranda will be distributed to all the members of the group before the tour begins.

The group will be invited to Geneva for a preliminary discussion lasting two or three days in order to secure a certain uniformity in the method of study. The party will then be divided into groups of two or three ; each group will visit two countries.

A study will be made of the methods employed in recording, tabulating and utilising hospital statistical data, case cards, etc., by a few selected general hospitals and dispensaries and in certain cases by Governmental or other sickness insurance organisations.

The detailed programme will be drawn up in consultation with the responsible authorities of the countries visited. The member of the group belonging to the country visited will take part in the stage of the tour in his own country and will doubtless be consulted by his own administration in drawing up the programme.

A final conference, lasting a week to ten days, will be held in Geneva, when the various systems seen will be described and compared. The results of these discussions should be of assistance to the Health Committee in determining the lines along which the study should subsequently proceed.

The total length of the tour will be about six weeks and will begin some time in September.

C.H. 423.

Annex 89.

SPECIAL STUDIES.

Control of Food Manufacture and Distribution.

Note on Resolution VI *of the Health Committee adopted during the October* 1925 *Session.*

This resolution provides for the preparation in the Health Section of preliminary information based upon available publications dealing with :

> "The control of the manufacture and distribution of food supplies in the interests of international public health."

The preparation of the preliminary report is to be carried on in consultation with the Financial and Economic Organisation of the League of Nations.

A. In pursuance of the terms of the resolution, material has been collected ;

(1) On international organisations dealing with foodstuffs, with special reference to the endeavours made by such organisations for the unification of methods of analysis (chemical and bacteriological) ;

(2) On national laws and regulations relating to foodstuffs for import and export ;

(3) On national legislation for the control of foods from the health point of view.

In view of the great variety of foods dealt with under these three headings, the preliminary enquiry has been restricted to :

(*a*) Milk and its product ;
(*b*) Margarine and fat ;
(*c*) Fresh meat ;
(*d*) Fresh fish ;
(*e*) Canned or preserved foods ;
(*f*) Frozen foods.

B. The Financial and Economic Organisation of the League of Nations is preparing a report on the protection of foreign buyers and consumers against worthless goods, including all measures to safeguard the public health by ensuring the purity and quality of foodstuffs by the application of certain sanitary regulations in the manufacturing and handling processes. The information collected for this purpose, while already very considerable, must be supplemented for a number of countries before it is complete. Several countries have instituted an efficient system of control and supervision of the manufacture and export of foodstuffs, and, by a system of marks, brands or seals applied to the products in proof of their quality, they make it possible for the consumer to recognise with ease the products which conform to the required conditions of purity.

C. The problem must be approached from the point of view of the importing as well as the exporting country. The Public Health Authorities of the former must be in possession of all the facts concerning the manufacture, handling and sanitary control of the country of origin before they are in a position to deal intelligently with imported foods.

The sanitary services of exporting countries must be in a position to apply the special measures required by importing countries in order to facilitate trade in foodstuffs.

The health authorities of both importing and exporting countries must be familiar with the legislation and organisation of the inspection services and with the methods of inspection and examination (grading, marking, etc.) in order to safeguard public health and to facilitate trade.

So important is this problem that bilateral conventions have been negotiated concerning methods of inspection, and the acceptance by the sanitary authorities of one country of the inspection and licence certificates of another. Owing to the variety of conditions under which food is produced and exported, and the wide differences in sanitary requirements, anything in the nature of a general sanitary convention would be premature at this time. However, the conclusion of bilateral agreements on particular subjects might be facilitated by the Health Committee on the request of the interested Public Health Services.

In addition, it might be possible to utilise the system of individual missions to assist the Public Health Services of the importing country to study the sanitary measures applied to foods in the country of export.

D. In order to define and restrict the scope of the enquiry, and to satisfy the requirements of the Government of the Kingdom of the Serbs, Croats and Slovenes, it is proposed to forward to that Government a note on the material collected by the Health and Financial and Economic Sections of the League of Nations, and to request a more precise definition of its needs.

C.H. 420.

Annex 90

SPECIAL STUDIES.

Infant Mortality and Child Welfare.

In accordance with a resolution adopted by the Health Committee at its October session, the Health Section has begun a study of infant mortality statistics as a preliminary step towards giving effect to the resolution adopted by the Sixth Assembly which was proposed by the Netherlands delegation.

Hitherto, attention has been confined to European countries. Figures are being collected and rates worked out for the 44-year period 1880-1924.

Infant deaths are being classified according to : the month of death ; sex ; the age at death (by months during the first quarter and by three-monthly periods during the remainder of the first year) ; the reported cause of death ; legitimacy or illegitimacy. Data are also being collected concerning the birth rates during the same series of years. Legitimate birth

rates are also being computed per 1,000 married women between the ages of 15 and 49 and illegitimate birth rates per 1,000 unmarried women of like age, as well as in the usual manner, per thousand births.

Tabular statements containing such data for ten to twelve European countries will, it is hoped, be available for members of the Health Committee before the close of the April session. A statistical analysis of the large amount of data being collected will take a considerable time. The results of such an analysis should be of great value to all interested in problems of child welfare.

The Child Welfare Committee of the Advisory Commission of the League of Nations for the Protection and Welfare of Children and Young People, at its fifth session, held in March 1926, decided to ask for the co-operation, help and advice of the Health Committee in collecting information concerning legislation dealing with the welfare of infants in force in different countries.

The resolution adopted reads as follows :

"In order to limit the scope of the proposed enquiry (collection of laws relating to early infancy), and in view of the fact that one of the principal divisions of vital statistics, 'Infant Mortality', covers the period from birth to the age of one year, the Sub-Committee proposes that the Commission should, for the time being, restrict its enquiry into legislation to this period of 'early infancy', and should in future employ this conventional expression when required in discussions on the subject.

"If, however, an important law on public health and social welfare begins to have effect shortly before birth, or any time up to about the third year, such law should also be quoted, but principally as it relates to the first year of life.

"The Commission proposes that the Secretariat should first proceed with the collection or analysis of legislative texts relating to one or more of the following questions (according as the Secretariat finds possible) :

"1. Legal provision for pre-natal services.

"2. Legal provision for infant welfare centres.

"3. Legal provision for the care of infants in their own families or placed out in institutions or in other homes.

"As public health as well as social interests are involved, the Commission feels that the co-operation of the Health Organisation is essential to the conduct of the enquiry, and therefore recommends that this programme be forwarded to the Health Committee for its consideration, help and advice."

The Health Committee will doubtless desire the Health Section to co-operate with the Social Section in obtaining and classifying such information.

The resolution adopted by the Sixth Assembly was framed as follows :

"The Assembly,

"Considering that the Council, in accordance with a resolution of the Fifth Assembly, invited the Health Organisation of the League to consider any measures within its competence which it would be desirable and practicable to undertake for the protection of children from the hygienic point of view ; and

"Convinced of the importance of this form of child welfare work :

"Decides to request the Health Organisation to investigate infant mortality from the point of view of feeding in infancy ;

"Requests the Council to instruct the Health Committee to undertake this investigation and to enquire into the advisability of constituting a Sub-Committee which would be able to call upon the co-operation of specialists in various countries in questions concerning child hygiene and which would be requested to initiate the investigation of this and of any other questions connected with child hygiene the consideration of which might be deemed expedient."

The Bureau has considered the question raised in the last paragraph and has decided to propose to the Health Committee that the co-operation of six experts in child hygiene — one each from France, Germany, Great Britain, Italy, the Netherlands and Norway — be invited to assist the Committee, as corresponding experts, in the consideration of the problems connected with child welfare which are now on the agenda.

C.H. 431.

Annex 91.

SPECIAL STUDIES.

A West African Bureau.

At its last session, the Health Committee requested the Medical Director to enquire as to the desirability and practicability of establishing a Sanitary Bureau for the countries on the West Coast of Africa. As a preliminary step, the member of the Health Section who is accompanying the West African interchange has been instructed to obtain information from

each colony or country visited regarding the methods now employed for ascertaining the existence of and reporting cases and deaths attributable to the more important communicable diseases. Enquiries are also being made as to how far public health measures for the prevention of the spread of infection are handicapped by the difficulties of obtaining prompt and reliable information on these matters. At the final conference of the interchange, which will take place in Freetown early in June, these matters will be discussed with special reference to the rôle that a centre of epidemiological intelligence in West Africa might play in facilitating anti-epidemic work. This discussion will naturally be of an unofficial nature and the administrations will be in no wise bound by the opinions expressed by their medical officers.

Letters were also sent to all West African administrations, through the usual official channels, acquainting them with the nature of the proposal, describing briefly the work now being done in somewhat different circumstances by the Singapore Bureau, and stating that a preliminary discussion of the proposal would take place during the interchange, as described above. No expression of opinion as to the merits of the proposal has yet been received.

It is hoped that sufficient information will shortly be forthcoming to enable the Health Committee to arrive at a decision as to the desirability of establishing such a bureau and to enable a detailed scheme to be prepared should the proposal be approved.

C.H. 432.

Annex 92.

SPECIAL STUDIES.

The Proposed Despatch of an Expert Medical Statistician to Latin America.

The Health Committee at its last session requested the Medical Director to study the nature and feasibility of any proposal that might be received from the administrations of Latin America regarding the delegation of an expert medical statistician to study statistical methodology in those countries. The only communication hitherto received is from the Director-General of the National Health Department of the Argentine, who desires to have an opportunity of discussing the matter during his visit to Paris to attend the International Sanitary Conference before any definite arrangements are made.

C. H. 427.

Annex 93.

SPECIAL STUDIES.

Sleeping-Sickness Commission.

The Sleeping-Sickness Commission started work early in the year. Dr. Duke and Dr. van Hoof arrived in Entebbe early in January, Professor Kleine a month later, and Dr. Lavier is due to arrive at the end of April. The Portuguese Government has expressed a desire that Dr. Prates, the director of the laboratory of Lourenço Marques, should join the Commission. We are at present waiting for further information with regard to this matter.

The work is progressing satisfactorily. Laboratory experiments are in progress on the effects of direct transmission of trypanosomes, the transmission of arsenic-fast strains of trypanosomes, and the effect of trypanocidal drugs on trypanosomes developing in tsetses.

Dr. van Hoof left Entebbe for the Majanji-Mpologoma sleeping-sickness endemic area in the Eastern Province on February 23rd, where he will study the distribution of human trypanosomiasis in the inland *Glossina palpalis* area. Dr. Kleine left Entebbe on March 8th, for the Kavirondo sleeping-sickness area. Here the disease is also associated with *Glossina palpalis*, and the Kenya authorities are about to undertake intensive eradication measures. A study of the conditions in this area at the present time is therefore of peculiar interest.

The duration of Dr. van Hoof's and Dr. Kleine's stay in these areas will be determined by the results achieved ; in the meantime, they will be in communication with Entebbe and will supply the laboratory with essential material for the enquiry.

The Commission is receiving every possible assistance from the local administrations, which are greatly interested in the enquiry.

C.H. 462.

Annex 94.

REVISION OF INTERNATIONAL LIST OF CAUSES OF DEATH

Note by the Medical Director.

The Health Committee, at its last session, decided to include in its programme of work the Revision of the International List of Causes of Death, and requested the Medical Director to ascertain the views of the various administrations on this subject.

In January 1926, a letter was received from the British Government stating that the competent departments of the British Government desired to co-operate to the fullest extent in the preparatory work so essential to the success of the next Revision. The General Register Office, in consultation with the Ministry of Health, had already reviewed its experience of the current International List and was preparing suggestions for amendments, a copy of which would be forwarded to the Health Committee in due course.

On February 15th, a letter was sent to the various Governments by the Secretary-General, asking that the competent departments of each Government should formulate their opinions regarding the question and keep the Health Organisation informed of any work undertaken by them in preparation for the Revision.

A copy of the changes proposed by the Committee of the American Public Health Association was forwarded to each Government.

The Belgian Ministry of Foreign Affairs states that the Belgian Health Department is willing to co-operate with the Health Committee in the preparatory work of the Revision.

The Italian Government states that the International List was first brought into use for the tabulation of the mortality statistics for 1924, which is not yet completed. Consequently, sufficient experience of the List has not been gained to warrant the expression of any opinion.

The Government of Czechoslovakia states that its competent departments are now studying the question and that the results of the study will be forwarded to the Health Organisation in due course.

The Norwegian Government considers the International List of Causes of Death unsuited for Norway, and the opinion is expressed that the List prepared at the meeting of Scandinavian statisticians in Stockholm in September last will be utilised for the statistical treatment of causes of death in that country.

At the last meeting of the Health Committee, it was stated that the report of the Scandinavian Committee of September 1925 would be forwarded to the Health Organisation in due course. This report has not yet been issued by the health administration of Sweden, which is in charge of the matter.

C.H. 422.

Annex 95.

THE SERVICE OF EPIDEMIOLOGICAL INTELLIGENCE AND PUBLIC HEALTH STATISTICS.

(a) *Current Epidemiological Statistics.*

Periodical reports on the prevalence of notifiable diseases are now received from 116 national and colonial administrations which together are responsible for the public health of more than two-thirds of the world's population. Reports for a number of cities are received from certain countries which do not possess a national system of notification. Special facilities for early publication are accorded the Intelligence Service by most health administrations, for they forward the information before its official publication in their respective countries. Provisional reports or advance information are now being received from one hundred national and colonial administrations. The delay in making this information available for the use of other health administrations has thus been considerably diminished. It may be mentioned that reports are now being received from all European countries with the exception of one; nearly all of these furnish provisional reports.

There is still, however, a lack of uniformity in so far as the periods covered by these reports are concerned. Forty-four countries and colonies send weekly reports, eight send ten-day, eight half-monthly and fifty-six monthly reports. One country reports the three first weeks of each month separately, and the remainder of the month is considered as a week. This lack of uniformity is obviously an obstacle to the comparative study of the data. The length of reporting periods has naturally been decided according to the needs of individual countries and is in large measure determined by the notification system in force. It is to be hoped, nevertheless, that a greater conformity may in time be obtained. It is interesting to recall that the numerous administrations contributing information to the Singapore Bureau

have unanimously adopted a weekly period ending Saturday at midnight for purposes of epidemic-disease tabulation in the chief ports.

Special attention has been given during the past months to the development of current statistical information concerning mortality from epidemic diseases and other important causes of death in large cities. The special value of such data depends on the fact that they can be made available comparatively quickly, in several cases a couple of years before the publication of the national mortality statistics. They furnish therefore a valuable, although admittedly provisional, indication of the trend of health conditions in the respective countries. Reports are now being received from 696 cities, either through the national health administrations or directly from the cities, with the approval of these administrations. This information is published currently in the *Monthly Epidemiological Reports*. In these reports appear also current statistics of natality and of general and infant mortality in cities. Meteorological data are published for selected stations.

These developments in the work of the service have resulted, during the course of the last half-year, in the enlargement of the *Monthly Epidemiological Report* from about 50 to an average of 72 pages. It is proposed to standardise the *Report* at this size for the remainder of the current year.

Tables showing the number of cases of epidemic diseases reported in each country and the causes of death registered in each city have been prepared for the *Annual Epidemiological Report* for 1925. These tables in proof form have been sent to the various national health administrations for completion and verification. At the time of writing (March 31st), replies enclosing verified data have been received from thirty-one countries. The British Ministry of Health and the French Health Administration have also kindly checked the data for the colonies and protectorates of their respective countries. Replies are still awaited from thirty-two countries and thirty-four cities, most of which are situated in distant parts of the world.

(b) *Singapore Bureau.*

The past six months have witnessed a consistent development in the work of the Eastern Bureau at Singapore. Regular telegraphic weekly reports are now received concerning health conditions in eighty-seven ports, and practically all are received up to time. A summary of these reports, which contain data regarding the number of cases and deaths from plague, cholera and smallpox, as well as information regarding the number of plague-infected rats found in ports, is received in Geneva every Thursday, where it is published on the same day as a leaflet, which is sent by post to the members of the Health Committee and to all European health administrations. Most European administrations thus receive information within a week of the termination of the period covered by the report.

The information received by the Singapore Bureau is broadcasted in code from Saigon every Friday. It is re-broadcasted by the Malabar station at Bandoeng in Java and also by Bombay and by Sandakan in British North Borneo. This multiple broadcasting is a recent development which will, it is hoped, surmount the difficulties in picking up messages hitherto experienced by many administrations.

As the Singapore Bureau now serves a very large area stretching as far west as Cape Town and Alexandria and as far east as Honolulu, it has been found advisable to divide the corresponding administrations into four groups : a western group, including the east coast of Africa and the Asiatic coast as far east as, and including, British India; a central group, comprising the Malay States, the Dutch East Indies, Borneo and the Philippine Islands ; an eastern group, comprising the Asiatic coast from Siam to Siberia, including Japan and Formosa ; and, finally, a southern group, with Australia, New Zealand and the South Sea Islands.

The Bureau, for economical reasons, adopted the practice of sending a comprehensive general telegram only to the larger administrations of the East, to Geneva and to the colonial administrations possessing large ports situated on ocean highways. To the other administrations it sends only a group telegram, containing information regarding ports in their own group which are of most importance to them.

The Bureau receives from each administration by post confirmation of the telegraphic returns. These letters contain other information of sanitary importance, such as the general death rate, deaths from various causes, the rainfall, etc. This supplementary information is published at Singapore, together with data regarding quarantine notifications, immigration and pilgrimage returns, in a weekly fasciculus, of which the fifty-fifth number appeared on April 1st.

The "AA Cable Code" has given full satisfaction and is being used for all telegraphic communications between the Singapore Bureau and the various ports served by the Bureau. It has been adopted also by certain other administrations for the mutual exchange of epidemiological information. A new edition of the code has been rendered necessary by the inclusion of many new ports in the system of information service : this is now being prepared at Singapore.

The Bureau has already rendered notable services to Eastern health administrations, especially in having kept them promptly informed with regard to the serious cholera outbreaks which have occurred in several Asiatic ports during the past twelve months. In this and in other ways it has demonstrated its great practical utility from the point of view of port health administration.

(c) *Report on the Still-Birth Committee.*

As stated in the report presented to the Health Committee at its last session, the Secretary-General sent the report of the Still-Birth Committee to the Governments of all States Members of the League and to Germany, Mexico, Russia and the United States of America. Replies have been received so far from the following seventeen Governments : Argentine, Australia, Brazil, Bulgaria, Czechoslovakia, France, Great Britain, Greece, Guatemala, Honduras, the Netherlands, Nicaragua, Norway, Poland, Union of South Africa and Venezuela.

The majority of these countries are in agreement with the definitions proposed and offer no further comment. The Governments of Australia, Brazil and the Union of South Africa state that they would be prepared to introduce such new legislation as the adoption of the definitions would demand. The British Government is unable to consider the adoption of the definitions proposed owing to numerous difficulties in connection with existing legislation to which such a change would give rise. The Brazilian Government recommends that the Health Organisation should undertake the preparation of an international nomenclature of causes of still-births. The same proposal is made by the Venezuelan Government, which also proposes that the Health Organisation should establish a standard form for the registration of still-births.

(d) *Statistical Handbooks.*

A statistical handbook on Austria, prepared by Dr. Major Greenwood and Major P. G. Edge, was published in December 1925. The manuscripts of three other reports, on Czechoslovakia, Portugal and Italy, by the same authors, have been received. The first two have been revised by the authorities concerned and the third is being revised by the Italian Health Administration.

Professor H. Westergaard has prepared a handbook for the Scandinavian countries which deals with the vital statistics of Denmark, Finland, Iceland, Norway and Sweden. The manuscript has been revised by the authorities concerned and is now in the printer's hands.

Mr. E. Sydenstricker reports that progress is being made in the preparation of the handbook describing the statistical system of the United States of America as a whole and of the individual States which he has kindly undertaken to prepare.

C. H. 430.

Annex 96.

INTERCHANGES OF PUBLIC HEALTH PERSONNEL.

I. — Report on the Interchanges since the Fifth Session of the Health Committee, October 1925.

The following programme of interchanges has been carried out since the fifth session of the Health Committee (October 8th-14th, 1925) :

1. Interchange in Japan.
2. Interchange in Mediterranean ports.
3. Interchange in Great Britain, for municipal medical officers.
4. Interchange in West Africa.

1. As stated at the last session of the Health Committee, the interchange in Japan opened at Tokio on October 18th and ended at Dairen on December 4th.

Seventeen public health officials from the following countries and territories attended :

Australia,	Indo-China,
British India,	New Zealand,
China,	Siam,
Dutch Indies,	Straits Settlements,
Federated Malay States,	Union of Socialist Soviet Republics.
Hong-Kong,	

After a week of general lectures at Tokio, given by the principal heads of departments in the Ministry of Health, the programme of visits began. The tour was divided into three parts :

(*a*) Inspection of the Japanese public health institutions, particularly those of the city of Tokio, water-supply system, sewage disposal, general hospitals, lunatic asylums, leper colonies, tuberculosis sanatoria, statistical and registration services, visits to fever hospitals, to the State Institute, under the direction of Professor Nagayo, to the Kitasato Institute for Infectious Diseases, to the Food Institute under the direction of Professor Saiki, to the Yokohama and Kobe quarantine-stations, and to the research station at Omia, north of Tokio, where research is being made into the persistence of the microbes of the typhoid group and intestinal parasites in cesspools, and the means of disinfecting these places; inspection

of the public health organisations at Osaka, the port of Kobe and the city of Kioto; visit to the University of Oyama, and demonstration of parasitological research and technique, which is very highly developed in Japan, in connection with ankylostomiasis and other parasitic diseases.

(*b*) Visits to the principal centres in Korea, inspection of the medical and colonising organisation, visits to the Institute for the Study of Infectious Diseases in Keijo (Seoul), the fever hospital under the direction of Professor Shiga, and to the Japanese School of Medicine in the Japanese concession at Mukden.

(*c*) Inspection of the health institutions established by the South Manchurian Railway Company along the railway from Mukden to Dairen and in the Liao Tung Peninsula (hospitals at Dairen and quarantine-station at Dairen).

A considerable amount of information for each of these visits and institutions had been prepared by the Japanese administration. The tours and visits proceeded with perfect regularity. The Japanese Public Health Department is worthy of all praise for the manner in which it prepared and organised the tour; the participants had their every want attended to and were everywhere received by the Japanese authorities with the most generous hospitality.

2. *Exchange of Public Health Personnel in Mediterranean Ports.* — This collective study tour opened at Barcelona on November 11th, 1925. It was attended by twelve medical officers of health from the following countries:

Algeria,	Italy,
Egypt,	Kingdom of the Serbs, Croats and Slovenes,
France,	Spain,
Great Britain,	Syria.
Greece,	

Dr. Raynaud had consented to undertake the direction of this group. Throughout the tour the participants everywhere met with a cordial welcome, and received the most generous hospitality from public health departments and port authorities.

A most interesting final conference was held at Geneva on December 22nd and 23rd. At this conference the participants suggested that the Health Committee should appoint a committee of doctors, bacteriologists, chemists, shipowners, shipmasters and engineers, to experiment in different ports on the different methods of fumigation at present in use. This committee would then be in a position to propose effective safeguards and to state definitely under what circumstances deratisation should be compulsory.

Dr. Raynaud is submitting a detailed report to the Health Committee.

3. The first general interchange of 1926 opened in London on February 22nd, and concluded at Geneva on April 1st. It was attended by fifteen medical officers of health from the following countries:

Austria,	Greece,	Poland,
Brazil,	Hungary,	Roumania,
Canada,	Italy,	Kingdom of the Serbs, Croats and Slovenes,
France,	Japan,	United States of America,
Germany,	Panama,	Union of Socialist Soviet Republics.

The programme was drawn up with the utmost care by the Society of Medical Officers of Health. It was carried out not only with the aid of Government Departments but also and especially with the help of the London County Council, the Corporation of the City of London and certain Borough Councils, and other Metropolitan organisations, to whom our most cordial thanks are due. The organisation of public health in Greater London and the home counties was studied in every detail. A special feature of this interchange is that it was held primarily for the benefit of municipal medical officers holding important positions in the administration of large urban centres.

The final conference was held at Geneva from March 29th to April 1st. Reports of great interest were presented by the participants, all of whom declared that they had gained valuable experience from their tour in England, and hoped to be able to profit by it in their own countries, so far as the financial position of the municipal health services under their control permitted.

4. The interchange of public health personnel in Africa opened at Dakar on March 20th. It is directed by a member of the Health Section and attended by seventeen medical officers belonging to the administrations of the Belgian, British, French, Portuguese and Spanish colonies and to the Union of South Africa and Guatemala.

The Health Section's representative has also the additional duty of investigating the possibility of establishing an Epidemiological Bureau at Dakar on the same lines as that already operating at Singapore.

As stated at the last session, this interchange will end at Freetown (Sierra Leone) on June 1st.

In making its preparations for this tour, the Health Section communicated with the Governors of the Colonies, through the Colonial Ministries of the countries concerned. The time-tables of the shipping companies serving West Africa were studied with care. Although thorough preparations had been made for this tour a long time in advance, it must

be realised that very considerable difficulties are inevitable in an expedition of this kind, since regular shipping services between the different colonies are almost non-existent. Certain territories have extensive systems of tolerably good roads, but these seldom run from one colony to another.

A more or less provisional programme was drawn up, and will in the main be followed, so far as means of communication and steamer sailings permit. The Health Section's representative has been left full latitude to take advantage of any chance ship in order to carry out the programme as best he can, while adhering to the itinerary and the dates so far as possible. According to this programme the participants will be :

From March 22nd to 30th,	in Senegal ;
April 2nd to 4th,	in Gambia ;
April 5th to 7th,	in Portuguese Guinea ;
April 9th to 18th,	in French Guinea ;
April 20th,	in Liberia ;
April 21st to 27th,	on the Ivory Coast ;
April 28th to 30th,	in Togoland ;
May 1st to 4th,	in Dahomey ;
May 6th to 14th,	in Nigeria ;
May 15th to 20th,	on the Gold Coast ;
May 21st to June 1st,	in Sierra Leone.

5. The next item on the interchange programme for 1926 will be the sanitary engineers' so-called interchange. A circular letter has been sent to forty-eight States, inviting them to submit a list of official engineers attached to the central health authorities or practising in large urban or rural centres. For technical and financial reasons, this interchange has been strictly limited to sixteen participants, who will have the opportunity of visiting in groups of four, in the course of one month, Birmingham, Glasgow, Liverpool and Sheffield, with a preliminary course lasting five days in London, followed by a Conference with Municipal and County Engineers in Bristol.

In London, the delegates will attend the Jubilee Congress of the Royal Sanitary Institute, to which they are invited by its Council. With the valuable assistance of a small representative committee, they will visit the waterworks of the various towns, investigate the port health organisations, and study the construction of fever hospitals, housing and town-planning schemes, arrangements for the disposal of refuse and model villages, such as Bournville (Birmingham).

The very large number of names of candidates sent in demonstrates the value of this interchange.

6. The third general interchange will take place in Denmark, and will last from May 27th to June 30th.

It is reserved for officials specially interested in the organisation and work of rural medical services, and will in all probability be attended by sixteen persons. The following countries have promised to send participants :

Bulgaria,	Norway,
Cuba,	Kingdom of the Serbs, Croats and Slovenes,
Czechoslovakia,	Spain,
Esthonia,	Sweden,
Germany,	Switzerland,
Great Britain,	United States of America.
Hungary,	

Replies are expected shortly from two other countries.

The programme of the Danish Public Health Department has been received. Groups of four participants will visit the various centres in Denmark, and will thus be able to make a very thorough examination of local conditions in each of the districts visited.

7. The Health Committee will doubtless recall the discussion which took place at the last session regarding "an interchange combining the features of individual missions and of collective study". The Health Administrations of France, Belgium and Holland have appointed medical officers engaged on a particular subject included in the general work of a medical officer of health. The number of the participants would be strictly limited to ten. They would meet as a group, after a short period of individual specialist study, the details of which would be prepared in advance by the Health Section, in consultation with the health administrations concerned. Meeting as a group, they would follow for three to five days the usual initial stage of a collective interchange, visiting only institutions of general interest. They would then divide into specialist groups, not more than three or four subjects being selected in all, and would study the appropriate institutions, meeting again each week for a common exchange of views and discussion. The same procedure would be followed in all the countries visited, and at a final conference in Geneva, with the participation of representatives from the countries visited, a useful discussion would certainly follow.

In accordance with the Health Committee's decision, the provisional programme submitted to the administrations concerned will cover a period of six weeks, during which the ten members forming the group will be able to visit Holland, Belgium, France and Switzerland. The principal subjects will be presented by lecturers who have been selected by the public health departments of the four countries concerned. The groups as a whole will attend these lectures, which will

not interfere with the specialist studies pursued by each member. The subjects selected by the participants are as follows: Prophylaxis against venereal disease, prophylaxis against tuberculosis, disinfection, child welfare, and health insurance in its relation to preventive medicine. Accordingly, two French departmental medical officers will deal with disinfection and prophylaxis against venereal disease, with the disposal of tuberculosis cases on discharge from sanatoria, and with seaside school colonies. A French inspector-general of administrative services of the Ministries of the Interior and Health will deal with land and sea quarantine, emigration and immigration. Two Belgian inspectors of the Ministry of Health and the Interior will deal with disinfection, while a third has instructions to study the teaching of hygiene in the widest sense of the term, including popular hygiene, and a fourth will deal with medical and school inspection. Two inspectors, Dutch Medical inspectors, will deal respectively with the relations of the semi-indigent to public relief services, with infant welfare, with prophylaxis and other measures against gonorrhœa, while a Tuberculosis inspector will deal with children's "preventoria" and open-air schools.

The first group meeting will be held at the City Public Health Office of Amsterdam, after a preliminary period of six days devoted by the participants to studies in towns lying between their homes and the above-mentioned city. The group will then proceed to The Hague for another conference at the office of the President of the Netherlands Public Health Council. Here the group will again divide, the members journeying separately by stages to Brussels, where they will assemble, towards the end of July, at the office of the Public Health Department. In this city, which will form a kind of headquarters for this interchange, the participants will be able to acquaint themselves with the methods of the Belgian public health services, the Belgian members meanwhile preceding their colleagues into France, where a further group meeting will take place on August 2nd at the National Office of Social Hygiene in Paris. The participants will continue their individual studies in France and a final group meeting and general discussion will take place at Lyons in the Laboratory of Hygiene of the Faculty of Medicine.

The programme will conclude with a period of visits and discussions in Switzerland from August 14th to 25th. On the 14th, the whole group will meet at the office of the Director of Federal Public Health Services at Berne. This meeting will be followed by visits to child-welfare and anti-tuberculosis institutions, after which there will be a final conference of all the participants at Geneva. Throughout the tour they will be accompanied by a medical member of the Health Section.

The Health Section has recently published and circulated to health administrations a printed pamphlet entitled "Interchanges of Public Health Personnel — Explanatory Note", which gives a brief survey of our "interchange" system and of the financial and other conditions applicable to participants during the period of an interchange.

Individual Grants.

This year, as previously, various public health departments have applied to us for grants in aid of the studies of certain of their officials. We have been able to make travelling grants to:

1. An Italian official, who was enabled to visit Holland, Belgium and France, for the purpose of making a special study of school hygiene and of the application of the modern methods of syphilography.

2. Two bacteriologists of the Australian health administration.

3. A Swiss public health specialist, for study at the principal laboratories of parasitology in France, England and Germany.

4. A bacteriologist of the Belgian Public Health Service, for the study of anti-diphtheric vaccination and special researches concerning measles and pathogenic intestinal bacteria.

The following study tours have also been arranged with the Sanitary Administrations:

Spain; three study grants;
Japan; four study grants;
Four study grants for European investigators for study at Japanese institutes.

The Municipal medical officer designated by the Persian Government will conclude his course at the end of April, after having visited France, England, Belgium and the Kingdom of the Serbs, Croats and Slovenes.

An important development arising out of our interchange system is the arrangement made between Poland and the Kingdom of the Serbs, Croats and Slovenes for a mutual interchange of medical officers to study the progress made in each country. The health administration of Poland has submitted requests to the Health Organisation and the Rockefeller Foundation for grants in aid of this scheme.

II. — Programme of Interchanges for 1927.

1. The funds available for interchanges next year will be less by $25,000, the grant of the International Health Board of the Rockefeller Foundation for 1927 being $50,000. As the Committee knows, the credits provided in the budget of the League amount to 150,000 Swiss francs. Detailed estimates will be submitted to the Budget Sub-Committee.

2. Collective interchanges for medical officers of health are proposed in Great Britain and Germany.

It is proposed to apply to the interchange in Great Britain the principle on which the interchange system was originally based and it would therefore be chiefly a period of study with local public health administrations. This has hitherto been arranged by dividing the participants into groups of 4 or 5, each studying in a different locality. Although satisfactory, this method was not easy to carry out for such large groups.

Whereas, if reduced to two officers belonging to two different nationalities, the group could enjoy all the advantages of individual instruction, while at the same time the British health official and his two foreign colleagues could exchange views and discuss the results of their experience. The organisers of the interchanges in London have favourably received this proposal, which would necessitate only slight modifications in the programme. The first week, as usual, would be spent by the whole group in London, in attending lectures at the Ministry of Health and in a general study of the whole national health organisation. The participants would then pursue their provincial studies in pairs for three weeks, followed by one week's general conference and discussion, probably in Oxford or Cambridge, at which the British officials would reply to any enquiries and observations. For a further fortnight the studies would be resumed, after which the whole group would make a week's visit to London, returning to Geneva for the usual final three-day conference.

The number of those taking part will probably be limited to ten or twelve, unless a delegation of health officials travelling at the expense of their respective administrations is attached to them.

It is hoped to obtain from the Federal health authorities of Germany a detailed programme for a general interchange. This interchange might be arranged on the model of the collective studies hitherto organised in Great Britain, the number of those taking part being fixed at fifteen, subject again to the possibility of adding health officials appointed by, and travelling at, the expense of their respective Governments.

3. In the past, the Committee has organised interchanges of health officials specialising in certain branches of health administration; this category of officers was also awarded individual scholarships. It is proposed that in 1927 the organisation of this kind of interchanges should be continued. But it would certainly be desirable for the specialists to devote their attention principally to problems with which the administrations of their countries have to deal. It would be an advantage if the health administrations could utilise these interchanges to promote the study of health legislations and could avail themselves of the researches of these officers in drawing up their own administrative measures; in the same way, the Health Committee could take advantage of this system to complete and co-ordinate the international health researches which it initiates.

It would be desirable to arrange a collective course of study for the medical officers of national health insurance organisations, this interchange to be undertaken in conjunction with the enquiry initiated on this subject by the Health Committee and to be guided by the same main principles. It would be necessary to visit three or four countries in succession; the interchange would probably not last more than six weeks.

The possibility might also be considered of organising one or two additional interchanges according to the wishes expressed by health administrations and particularly by the public health services of Latin-American countries.

It is regretted that it is not possible to submit at this session a detailed plan of the Parliamentary interchange which was referred to in October. A preliminary programme is being drawn up which it is hoped to submit to the Committee at its next session.

4. It is proposed that eight scholarships for Far Eastern countries should be provided in the budget estimates for individual missions on the lines suggested in the report on Japan and China. It would be very desirable to continue the interchanges between health officials and laboratory specialists of the West and our colleagues of the Far East.

5. The Committee will perhaps desire to continue the work begun during the interchange of port health officers and arrange a tour of this kind either in Baltic and North Sea ports or in ports of the Far East.

6. Lastly, the Committee will perhaps desire to carry out a suggestion made in the course of the discussions on interchanges two years ago, to the effect that professors of hygiene should be invited to take part in the collective studies arranged for health officers, or that a special interchange should be arranged for them.

Annex 97.

NOTE ON THE CONVENING OF AN INTERNATIONAL CONFERENCE ON RABIES.

On various occasions during the last few years requests have been made, either to the President of the Health Committee or to the Medical Director, that the Health Organisation should examine the international aspects of the problems connected with the treatment of rabies. Professor Pfeiffer, of the University of Breslau, had proposed that a questionnaire should be sent to all the anti-rabies institutes of the world, requesting detailed information on the methods of inoculation employed, the frequency of post-inoculation paralysis, and cases in which the treatment has proved a failure.

Professor Kraus, of the University of Vienna, also wrote to Professor Madsen, drawing attention to the constantly increasing number of cases of post-inoculation paralysis (sometimes attended with fatal results in certain countries) and to the necessity of co-operation between the different countries — the only method, in his view, of reaching a solution of the disputed points ; and urged the convening of an international conference, to include the directors of the principal anti-rabies institutes, for the discussion of the various problems arising out of the treatment of rabies. Professor Kraus had previously been in correspondence with Professor Roux, of the Pasteur Institute at Paris, and had informed him of his plan, which, as a matter of fact, was on the same lines as the plan which the Pasteur Institute at Paris had proposed to carry out in 1913.

Meanwhile, Professor Calmette was sounded as to the desirability of holding an international conference on rabies. In his reply, which expressed the opinions of the whole Pasteur Institute, he stated that he agreed on all points with the proposal submitted to him, and considered that the Health Committee was the most appropriate body to convene such a conference and to work out its programme. He further hoped that the future international conference on rabies would be held at Paris and would sit in Pasteur's house.

Professor Calmette considers that the conference ought not to be held before the spring of 1927, in order to allow time for the rapporteurs — who would have to be selected and who, in his opinion, should include Dr. Remlinger, of the Tangier Institute — to draw up general memoranda on the subject for communication to the persons who would be invited to the conference, *i.e.*, to the directors of the principal anti-rabies institutes of the world.

Professor Calmette has recently been corresponding with Dr. A. Marie and Dr. Remlinger with regard to the preparation of a provisional list of questions to be dealt with by the conference.

In view of the importance of the proposals which it has received, the Bureau of the Health Committee decided, at its last meeting, to lay the whole question before the Health Committee and to ask its consent for the convening of an international conference on rabies in 1927.

A list of the principal anti-rabies institutes is given below.

LIST OF THE PRINCIPAL ANTI-RABIES INSTITUTES.

EUROPE.

Austria.
Vienna.
Belgium.
Brussels.
Bulgaria.
Sofia.
Czechoslovakia.
Prague.
France.
Bordeaux.
Lille.
Lyons.
Marseilles.
Montpellier.
Paris.
Germany.
Berlin.
Breslau.
Dresden (since March 1923).
Greece.
Athens.
Hungary.
Budapest.
Italy.
Bologna.
Faenza.
Florence.
Messina.
Milan.
Naples.
Padua.
Palermo.
Pisa.
Rome.
Sassari.
Turin.
Poland.
Cracow.
Lemberg.
Vilna.
Warsaw.
Portugal.
Lisbon.
Roumania.
Bucharest.
Jassy.
Russia.
Kerson.
Kharkov.
Leningrad.
Moscow.
Odessa.
Perm.
Samara.
Tiflis.

Kingdom of the Serbs, Croats and Slovenes.
Nish.
Novi-Sad.
Sarajevo.
Zagreb.
Spain.
Barcelona.
Madrid.
Switzerland.
Berne.
Turkey.
Constantinople.

ASIA.

Bangkok, Bombay, Calcutta, Coonoor, Hanoi, Jerusalem, Kasauli, Kobe, Rangoon, Saigon, Seoul, Shanghai, Shillong, Taihoku, Tokio.

AFRICA.

Algiers, Antananarive, Cairo, Dakar, Rabat, Tangier, Tunis.

AMERICA.

Buenos Ayres, Chicago, Lima, Mexico, New York, Pernambuco, Rio de Janeiro.

OCEANIA.

Bandoeng.

C.H. 435.

Annex 98.

FURTHER NOTE ON THE REPLIES RECEIVED FROM GOVERNMENTS REGARDING THE REPORT OF THE DEAD-BIRTH COMMITTEE.

The report of the Committee studying the definition of Dead-Birth, which was circulated to all States members of the League and to Germany, Mexico, Russia and the United States of America, stated :

"It is requisite in drafting the desired definition to have a clear understanding of what constitutes a 'birth' and when such 'birth' is complete.

"In the proposed definition, the word 'birth' means the separation and extrusion of a fœtus from the body of the parturient woman. The birth is to be deemed complete at the instant when the whole of the body of the fœtus — head, trunk, limbs — is outside the body of the mother.

"The birth is to be deemed a live-birth if, after birth (as defined above), the infant breathes.

"The act of respiration is incontrovertible evidence of life and its continued absence is to be taken as proof of fœtal death.

"It is desirable, for statistical purposes, that a distinction should be made between the birth of a fœtus which can normally be expected to be capable of an existence independent of its mother and the expulsion of one which cannot, births in the latter category being regarded as miscarriages (abortions).

"A fœtus capable of an independent existence is a 'viable fœtus' and is the product of a gestation which has lasted at least twenty-eight weeks. Such fœtus will normally measure at least 35 cm. from the crown of the head to the sole of the heel, the body being fully extended. We are of opinion that the latter criterion is the more trustworthy.

"Hence, a 'dead-birth' is the birth of a fœtus, after twenty-eight weeks' pregnancy in which pulmonary respiration does not occur ; such a fœtus may die either : (*a*) before, (*b*) during, or (*c*) after birth, but before it has breathed.

"It is desirable that every live-birth should be entered in the *Register of Births*. An infant born alive but dying before registration of its birth should be entered both in the register of births and in that of deaths, the prescribed certificate of cause of death being produced at the time of registration or subsequently thereto, as may be by law directed.

"It is desirable that every dead-birth should be inscribed in a *Record of Dead-births*. The person responsible for the registrations should be required to produce, whenever possible, a certificate of cause of death, such certificate to be signed by a recognised medical practitioner. The information to be given in the certificate and the form thereof should be prescribed by the competent authority.

"In countries requiring the registration of births of non-viable fœtuses (as defined above), such births should, we consider, be entered in a separate record, with such information as to duration of pregnancy, cause of abortion and other particulars as may be prescribed by the competent authority."

From the replies already received it would appear that there is a general unanimity of opinion regarding the practical advantages of the definitions proposed, though in certain instances their adoption would entail considerable difficulties owing to changes in legislation that would be necessary.

The *Australian* Government states that the report of the Royal Commission on Health which has recently been issued contains a recommendation that the Commonwealth should take the necessary steps to secure the uniform registration of still-births in Australia in accordance with the recommendations of the Health Organisation of the League of Nations. As soon as it is found to be practicable, the Commonwealth Government will consider the possibility of giving effect to this recommendation.

The Government of the *Union of South Africa* states that the only material point of difference between the system of registration of still-births now in use in South Africa and the system proposed by the Health Committee of the League of Nations relates to the definition of a viable fœtus, which is in South Africa a six-month fœtus as compared with a 28-week fœtus recommended in the Experts Committee's reports. The Union Government says that it will proceed with the necessary legislation to adopt the suggested definition as soon as a suitable opportunity occurs, if the Health Committee's proposals are adopted. From a statistical point of view, the existing procedure in South Africa is identical with that recommended.

The Government of *Siam* states that the proposals are acceptable and is of opinion that the definition should be adopted for future statistical work. Statistics of natality and infant mortality are already compiled in Siam in accordance with the proposed rules.

The Government of *Bulgaria* states that the departments interested have agreed to adopt the recommendations of the report without any modification.

The Government of *Poland* states that the report has been considered by the "Commission générale du Service sanitaire", which recognises the practical advantages of the proposed definitions. The report is now under consideration by the Ministry of Justice and the Central Office of Statistics, whose opinions will be forwarded in due course.

The *Greek* Government states that their statistical services have no remarks to make as the respiration test and a minimum gestation of six months as a criterion of viability are already adopted in Greece.

The Government of *Czechoslovakia* states that the Government departments concerned agree with the definition of dead-birth proposed by the Health Organisation of the League of Nations as well as the proposed adoption of 28-weeks as the minimum age of a viable fœtus.

The *French* Government, in acknowledging receipt of the letter, states that their Health Service have no observation to make regarding the proposed definitions.

The Government of *Great Britain*, while appreciating the practical advantages of the definitions proposed, points out that their adoption would entail very considerable changes in legislation, which it is not prepared to recommend at the present time.

The Government of the *Netherlands* states that their competent departments do not approve the measurement of the fœtus as an alternative method of determining viability. It states, moreover, that an adoption of the recommendations of the Committee would entail changes in legislation. In the Netherlands, under the heading "still-births" are included all infants who die before registration ; necessary corrections are made, however, for statistical purposes.

The Government of *Norway* describes the existing procedure, but gives no definite opinion regarding the value of the proposals put forward by the Committee.

The reply received from the Government of *India* states that the directors of Public Health of the various provinces recognise the soundness of the suggestions made by the Committee. One or two of them proposed to issue instructions with a view to bringing their systems of registration into line, as far as possible, with the recommendations of our Committee. The majority, however, considers the suggestion at present impracticable owing to the somewhat backward condition of demographic statistical methodology.

The Health Department of the Government of *Brazil* is in full agreement with the definitions proposed by the Committee. At present abortions are considered as still-births, but in future it is proposed to distinguish viable from non-viable fœtuses, as recommended in the report of the Committee. It further points out that the establishment of an international nomenclature of the causes of dead-birth is much needed.

The Government of *Venezuela* is likewise ready to adopt all the recommendations and similarly proposes that the Health Organisation of the League of Nations should establish an international nomenclature of the causes of still-births as well as a standard form of registration of still-births.

The remaining acknowledgments hitherto received express no definite opinion as to the value of the recommendations made.

The Health Committee will probably desire that the interesting suggestions made by the Health Administrations of *Brazil* and *Venezuela* should be taken into account when the revision of the International List of Causes of Death is under consideration.

C.H. 425.

Annex 99.

PROVISIONAL BUDGET OF THE HEALTH ORGANISATION FOR 1927.

Schedule O.

Chapter II. Item 23.

			Estimates		Expenditure	
			1927	1926	1925	1925
			Swiss francs			
		International Health Organisation	1,030,515	988,165	809,764	813,611
		I. *Secretariat* :				
		1. Salaries of the Health Section	327,265	289,915	264,514	249,037
Posts :						
1926	1927					
1	1	Medical Director (41,000-2,500-53,000)	53,000			
2	3	Members of Section Class A (19,000-800-28,000)	64,734			
4	4	Members of Section Class B (13,700-800-19,000)	68,114			
1	1	Member of Intermediate Class (10,000-300-14,400)	10,500			
1	1	Secretary of Section (10,000-300-16,250)	10,770			
2	2	Secretary Shorthand-Typists (8,700-250-11,250)	18,298			
1	1	Senior Assistant (8,700-250-11,250)	9,775			
1	1	Senior Assistant (8,700-250-11,250)	9,700			
3	2	Bilingual Shorthand-Typists (7,500-250-10,000)	15,441			
1	1	Shorthand-Typist (7,000-200-9,500)	7,725			
		Locally recruited Staff :				
3	4	First-Class Clerks (5,000-200-8,000)	28,325			
4	5	Second-Class Clerks (4,500-175-7,000)	27,739			
—	1	Shorthand-Typist	4,713			
—	1	Messenger (2,400-100-4,000)	2,400			
24	28					
		Overtime	3,000			
		Deduct : Reduction in salaries due to lower cost of living	6,969			
		2. Salaries of temporary staff	178,555			
		Deduct : Appropriation-in-Aid : Part of Rockefeller Foundation Grants I, II and III	178,555			

	Estimates 1927	Estimates 1926	Estimates 1925	Expenditure 1925
	Swiss francs			
Posts :				
1926 1927				
1 1 Chief of Epidemiological Service	37,830			
2 2 Members of Section Class A...........	52,330			
4 5 Members of Section Class B............	82,051			
Locally recruited staff :				
2 2 Second-Class Clerks	10,050			
9 10				
Deduct : Reduction in salaries due to lower cost of living	3,706			
3. Travelling and removal expenses	55,000	55,000	40,000	45,571
4. General Printing and Documentation	2,000	3,500	6,000	1,297
5. Cables, telegrams and telephones	10,000	10,000	10,000	8,848
6. Miscellaneous petty expenses and unforeseen contingencies	2,000	2,500	5,000	930
II. *Epidemiological and Public Health Intelligence :*				
1. Special reports and enquiries 108,019 *Deduct* : Appropriation-in-Aid : Part of Rockefeller Grant II 90,769	17,250	17,250	17,250	17,192
2. Publications..............................	70,000	60,000	60,000	69,542
3. Sanitary notifications and notifications in case of epidemics	15,000	15,000	15,000	—
4. Epidemiological enquiries	50,000	45,000	50,000	50,000
5. Collective and individual studies of public health statistics .... 84,215 *Deduct* : Appropriation-in-Aid : Part of Rockefeller Grant III ... 82,215	2,000	—	—	—
III. *Health Committee and Conferences :*				
1. Sessions of Health Committee	85,000	90,000	50,000	58,521
2. Special investigations (this includes expenses of technical sub-committees appointed by the Health Committee)	145,000	150,000	142,000	133,414
3. Technical Conferences and enquiries on the spot	100,000	100,000	—	—
IV. *Interchange of Public Health Personnel :*				
1. Expenses in connection with a system of liaison between the various national Public Health Services	150,000	150,000	150,000	147,624
2. Collective, specialised and individual interchanges .... 186,492 *Deduct* : Appropriations-in-Aid : Part of Rockefeller Grant I. 186,492	—	—	—	—

C.H. 473

Annex 100.

WORK OF THE SMALLPOX AND VACCINATION COMMISSION

Note by Professor Ricardo JORGE.

April 1926.

The Smallpox Commission met at The Hague from January 4th to 7th, 1926. In addition to the five members of the Health Committee who constitute the Commission, the following experts attended the meeting :

Dr. BASTIAANSE, Netherlands,
Dr. BLAXALL and
Dr. Mervyn GORDON, Great Britain,
Professor GINS, Germany,
Professor LEVADITI, France,
Professor SOBERNHEIM, Switzerland,

to all of whom the Commission is indebted for much valued help and advice.

After an interesting and fruitful discussion, it was decided to send a letter to all public health administrations directing attention to the occurrence in certain countries of cases of post-vaccinal encephalitis, and asking that full reports be forwarded to us should cases of this nature have been observed or should cases come under observation hereafter. Attached to this communication was a description of the symptoms and pathological findings in the cases hitherto studied and an indication of the nature of the pathological investigations that are desirable, should further cases occur. A copy of this letter was sent to each member of the Health Committee for information. Up to the present no reply has been received.

Secondly, it was decided to make a study of the methods employed in Government Institutes and in Institutes under Government Control for the preparation, examination, distribution and use of vaccine lymph : a questionnaire was drawn up by the Conference, a copy of which has been sent to all public health administrations.

Finally, it was also decided to undertake a comparative investigation of various laboratory methods that are employed for the estimation of the potency of vaccine lymph. This enquiry has already begun. The methods being tested are those of :

(1) Calmette and Guérin,
(2) Gins,
(3) Groth,
(4) Sobernheim.

The enquiries are being undertaken by Drs. Levaditi and Guérin in France, by Drs. Mervyn Gordon and Blaxall in England, by Professor Gins in Germany and by Professor Sobernheim in Switzerland. An invitation was also sent to the United States of America asking for the co-operation of a laboratory in that country.

A detailed description of the technique of each of the above methods was supplied by the author and sent to each investigator.

Samples of a strain of lymph kindly supplied by Professor Sobernheim were sent on March 1st to each of the investigators to be tested for potency, and the results obtained with the different methods of titraction will be collected and compared. Strains from other sources will subsequently be tested.

On behalf of myself and of all the members of the Commission and Experts who attended the meeting at The Hague, I desire to express to Dr. Jitta our most sincere thanks and appreciation for the arrangements that contributed so largely to the success of the meeting and for the lavish hospitality and kindness extended to us all.

C.H. 465.

Annex 101.

THE DARLING MEMORIAL MEDAL AND PRIZE FUND.

Note by the Medical Director.

Including the sum of 1,000 dollars promised by the International Health Board of the Rockefeller Foundation as a contribution to the Darling Memorial Prize Fund, contributions promised and received up to date amount to approximately 7,000 Swiss francs.

It is probable that the total contributions received will be somewhere in the neighbourhood of 11,000 Swiss francs. Such a sum would be sufficient for the *biennial* award of a medal, in bronze, and a prize approximating 1,000 Swiss francs.

The medal might suitably be $2^1/_4$ inches in diameter, bearing on one side the portrait

and name of Dr. Darling (with the years of birth and death) and round the margin "The Darling Prize : Prix Darling" and on the reverse, round the margin, "League of Nations-Health Organisation" in French and English ; and in the centre "For distinguished Malaria Research", and the name of the prize-winner and year of award.

The cost of cutting two steel dies for such a medal would approximate £50. This would be a charge on the capital fund. The balance of the fund would be invested in trustee security, the interest on which, less some 20 Swiss francs, the cost of striking the bronze medal, would constitute the Darling Prize to be awarded biennially.

It is suggested :

That the Secretary-General for the time being of the League of Nations and the President for the time being of the Health Committee of the League of Nations shall be the sole trustees of the said Fund *ex officio*, and the trusteeship shall in each case pass with the office :

That the Fund shall be administered and the income arising therefrom shall be applied by a Darling Prize Fund Committee constituted as follows :

The President and Vice-Presidents of the Health Committee of the League of Nations.

The Chairman of the Malaria Commission of the Health Committee of the League of Nations.

The Medical Director of the Health Section of the Secretariat of the League of Nations.

That this Committee be empowered to alter its own constitution by resolution from time to time and adopt such resolutions as it thinks fit with regard to its own proceedings.

That the income arising from the Fund shall be applied under the direction of the said Committee in the manner mentioned in the schedule hereto, and, in carrying out the trust, the Trustees shall observe any lawful directions from time to time given to them by the said Committee.

Regulations as to the Method of Application of the Income of the Darling Memorial Fund.

The income of the Fund shall be applied in providing the Darling Medal and Prize, subject to the following conditions :

(1) The Prize to be called the Darling Memorial Prize shall consist of a bronze medal and a sum of 1,000 Swiss francs or such other sum as the income of the Fund may be from time to time sufficient to pay.

(2) The Darling Memorial Prize shall be awarded biennially to the living author of such original work in connection with Malaria as the above-named Committee, on the advice of the Health Committee, may consider to be deserving of the honour. The first award of the Prize will be made in 1927.

(3) Such work must have been published within the five years immediately preceding the award of the Prize, or submitted to the Health Organisation of the League in unpublished form.

(4) No limitation is imposed as to the age, sex, profession or nationality of the author.

(5) Any member of the Health Committee or of its Malaria Commission or any national health administration is at liberty to propose the name of a person considered worthy of consideration in the adjudication of the award, together with a written statement of the reasons on which the recommendation is based.

Such recommendation should be addressed to the Medical Director of the Health Section of the Secretariat of the League of Nations on or before December 31st preceding the year in which the award is made. The Medical Director will be responsible for forwarding copies of these recommendations to each member of the Health Committee and of its Malaria Commission.

The Malaria Commission, at its first meeting in the year of award, will discuss the relative merits of the work of the persons proposed and its Chairman shall forward its opinion to the Health Committee, who will advise the Darling Prize Fund Committee with regard to the award.

C.H. 467.

Annex 102.

FURTHER PARTICULARS CONCERNING VISCERAL LEISHMANIOSIS IN SPAIN AND THE MEDITERRANEAN DISTRICTS.

Provisional Report by Professor G. PITTALUGA (Madrid).

[*Translation*]

1. Since my report dated September 15th, 1925[1], was submitted to the Health Committee last October, a few fresh cases of visceral leishmaniosis have been recorded in Spain, three at Madrid and 11 at Talavera de la Reina (Toledo). The cases observed by M. David Ortega in the dispensary at Talavera de la Reina, which, on September 15th, 1925, numbered 55, now therefore amount to 66. A few fresh cases were also studied at Navalmoral de la Mata (Caceres).

I may add that the general campaign for discovering and tracking down cases has been inaugurated in almost all the provinces of the Kingdom where climatic and epidemiological conditions combine to suggest a likelihood of the presence of cases of leishmaniosis.

2. Two objectives were indicated both in my report and in the highly interesting report submitted at the same time by our colleague, M. L. Raynaud ; these were to have been attained as far as possible under the auspices of the Health Committee and with its financial support, viz :

(*a*) Systematic investigation to obtain in every Mediterranean country an accurate report of all cases of visceral leishmaniosis (*demographical* enquiry) and of the conditions governing the domestic and rural foci of this disease (*epidemiological* enquiry) ;

(*b*) *Etiological* research, carried out conjointly and in close co-operation by those scientists who, in Italy, Northern Africa, Greece, Spain, Portugal and France, devote their attention more especially to the study of infantile kala-azar.

These notes contain a summary of what has been done in this direction during the last few months, in response to the cordial reception given by the Health Committee to the proposal submitted at the October session by M. Raynaud and myself ; our proposal was carried out with the help of the Director of the Health Section, who, in consultation with us, laid down the lines upon which it was to be carried out.

3. *Demographical and Epidemiological Enquiry.*

In Spain, the demographical and epidemiological enquiry is being carried out according to the following principles :

(*a*) Heads of dispensaries, permanent or temporary, in malarial zones (the latter to resume their work on May 1st next), have again been instructed to increase their efforts to discover and track down cases, and, further, to obtain data concerning the causes of infantile mortality from the registers kept at the municipal offices during the last ten years, in accordance with the plan established.

Italian investigators have recently put forward the theory of a certain degree of cross-immunity between malaria and leishmaniosis, and have even asserted that, as a rule, leishmaniosis is infrequent in zones where endemic malaria prevails. We have therefore suggested that heads of dispensaries should make a special enquiry into this question, the importance of which is enhanced by the fact that in Spain it was actually in the endemic malaria zones (Tortosa, Toledo, Valencia, Cáceres, etc.) that infantile kala-azar was met with in the first instance, or diagnosed and observed in a number of cases.

(*b*) A circular has been drawn up and sent to provincial health inspectors by the Department, urging them to encourage this research-work and to compile statistics for visceral leishmaniosis in each province as quickly as possible.

(*c*) Visits to supervise and inspect the preliminary work and the special investigations at Talavera de la Reina, to which we shall refer later, have been made by myself and Doctor de Buen.

(*d*) The attention of the medical profession as a whole, and more especially of country doctors, has been drawn to this subject, and their interest aroused, by special publications. A new edition has been issued, numbering several thousand copies, of the little popular pamphlet on "Kala-azar", written and published last year by Dr. de Buen. A literal translation of my report to the Health Committee last October has also been published in Spanish (in the Barcelona *Medical Review* and in the *Actualidad Medica* of Grenada). Papers on a few fresh cases have appeared in the scientific journals, and a discussion has taken place on the question of microbiological diagnosis by punction of the spleen, by MM. Pittaluga, Torrademé, and David Ortega, in "La Medicina ibera" (November 1925 to March 1926). Finally, the National Pediatries Congress which was held at Saragossa in October 1925, at the suggestion of our friend, M. Bravo Frias, specialist in pediatries at Madrid, expressed the hope that the Government would undertake a medical campaign against leishmaniosis ; and the problem of visceral leishmaniosis was adopted as an official subject of a report for the next Pediatries Congress, which will be held at Valencia in 1927. Doctors Garcia del Diestro and de Buen have been appointed rapporteurs.

[1] Printed "1923" by error.

4. *Etiological Enquiry and International Co-operation.*

Etiological research was only resumed at the end of the winter. With Dr. de Buen, we went to Talavera de la Reina in December 1925 and February 1926, and in consultation with M. Ortega, head of the local dispensary, we chose the spot and made the necessary arrangements for an experimental study of the possible transmission of *Leishmaniæ* by *Phlebotomi*. We tried to solve practical problems which present no small difficulties, concerning the rearing both of *Phlebotomi* (under as nearly natural conditions as possible) and of the small saurians commonly called "geckos" (*Emydactylus turcicus; Tarentola mauritanica* and kindred species) on which the *Phlebotomi* thrive by sucking their blood. We had a special cage constructed, clear of the ground, for experiments in transmission from dog to dog, or directly to the dog from a virus passed by the *Phlebotomi* and of human origin. We propose for the time being to centralise all etiological research-work at the Talavera Dispensary, which has been thus equipped and also has a municipal hospital ready to receive Leishmaniosis patients, as we know from the Malaria Commission's visit.

With regard to the assistance of research-workers in the various Mediterranean countries (amongst which we may include Portugal), although no definite agreement including a systematic scheme of research has been drawn up, we have to thank Dr. Raynaud for being able to count on such reliable centres of study as those directed by M. Ch. Nicolle at Tunis, which our Committee will have the good fortune to associate with its work, and of M. Sergent at Algiers. We ought also to apply to M. Paul Giraud, who has recently published an excellent monograph on "Infantile Kala-azar in France", for his help on the question of the foci of leishmaniosis at Nice and Marseilles.

Further, M. Jemma, Professor of Pediatries at Naples, and Professors Di Cristina, of Palermo, Longo, of Catania, and Caronia, of Rome, have also been invited by me, as the outcome of the agreements reached in October, to represent in this joint effort the contribution of the Italian school, which has collected highly important data and recorded nearly two thousand cases of leishmaniosis during the last fifteen years. Professor Cardamatis might be asked to collect all available data concerning kala-azar in Greece, and M. Ricardo Jorge should be invited to nominate for Portugal one of the research-workers who have specialised in kala-azar.

The preliminary steps for this agreement were taken in November 1925. Dr. L. Raynaud and the Health Section will perhaps be able severally to inform the Committee of the stage which has now been reached. We think that in any case, in October, at the next session of the Health Committee, preliminary conclusions might be presented which would be of scientific and practical interest.

Madrid, April 15th, 1926.

PITTALUGA.

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Annex 103.

CONTINUATION OF THE ENQUIRY INTO LEISHMANIOSIS IN THE MEDITERRANEAN BASIN BY DR. LUCIEN RAYNAUD.

In continuation of the paper on leishmaniosis in North Africa submitted in October last, and with a view to helping the enquiry which is being conducted by Professor Pittaluga, we now offer the following contribution towards the study of leishmaniosis in the Mediterranean basin.

I. *Kala-azar in the Marseilles and Nice Districts.* — In the returns for North Africa, numerous cases of kala-azar were reported in Provence and the Alpes-Maritimes, and the following information is now to hand :

(a) *Marseilles District.* — The first case of kala-azar in the Marseilles district was reported by M. Labbé, M. Turghetta and M. Ameuille in 1918. In 1913, Dr. Zuccarelli, at Montpellier, submitted a thesis in which he gave particulars of five cases diagnosed at Marseilles. Quite recently, Dr. P. Giraud [1], in his thesis on aggregation, described 28 cases of kala-azar, including those reported by Labbé and Zuccarelli.

In a chart accompanying his paper, P. Giraud shows that, of his 24 patients, 11 lived in the town of Marseilles and its suburbs and 13 on the outskirts of the town.

He adds that, during the war, Indian troops were encamped in that suburb not far from the present foci, and he is inclined to consider them as the source of infection.

Between 1914 and 1917, Pringault carried out researches into leishmaniosis among dogs in Marseilles. He found that they were infected in a proportion of 2.8 per cent and foretold an outbreak among human beings in the near future.

P. Giraud denies the possibility of infection through almost all insects and ixodes ; he seems to ignore the previous papers in which phlebotomi are made responsible for transmitting the infection.

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[1] Paul GIRAUD : "Le kala-azar infantile en France", Société Anonyme du *Sémaphore*, 17, rue Venture, Marseilles, 1926.

(b) *Nice District.* — At the meeting of the Medical Society of Paris Hospitals held on November 26th, 1925, M. d'Oelnitz, M. Daumas, M. Liotard and M. Puech (of Nice) reported 14 fatal kala-azar cases in all, which had occurred within the last few years in the Alpes-Maritimes. These, with the 28 recorded by P. Giraud, bring the total of native cases at present known on the French shores of the Mediterranean to 42.

To complete the list, four cases recorded in France but imported from Macedonia, Corsica, Morocco and Tunis should be added.

A report made by L. Rozier, Veterinary Surgeon at Grasse [1], is not without importance. Since 1912, he has observed progressive anæmia among the dogs of the district, accompanied by refractory eczema, herpetic patches round the eyes and ears, depilation, etc. Suspecting leishmaniosis, he treated two dogs with emetics and obtained quite surprising results.

This observation should be checked by laboratory research. If confirmed, it would prove that canine leishmaniosis exists alongside of infantile leishmaniosis in that part of the Alps.

II. *Cutaneous Leishmaniosis in Palestine.* — Dr. Heron, Director of the Health Service in Palestine, has been good enough to furnish us with interesting information on leishmaniosis in Palestine.

It shows that, up to the present, no case of kala-azar has been reported in Palestine, and that, according to the researches made by P. A. Buxton, there is no internal leishmaniosis among the dogs of Jerusalem.

Various authors have reported and proved the presence of Oriental sore at Jericho, Kantara, Artuf, Bethlehem and Manza (suburb of Jerusalem).

Adler and Theodor, repeating at Jericho the experiments made by Sergent, Parrot, Donatien and Bréguet (1921) in Algiers, found, in a female *Phlebotomus papatasis*, herpetomonas which, when inoculated into the forearm of a volunteer, produced, a month and four days later, a papule in which Donavan bodies were discovered. This would tend to prove that *P. papatasis* may be a carrier of Oriental sore.

III. During our visit to the Mediterranean, we requested M. Copanaris, Director of the Health Service at Athens, to furnish us with documents on leishmaniosis in Greece. We intend to follow M. Pittaluga's example and appeal to the other doctors in the various Mediterranean countries, chiefly to Drs. Ch. Nicolle (Tunis), Ed. Sergent (Algiers), P. Giraud (Marseilles), and d'Oelnitz (Nice), to assist in this research and bring forward any new facts which may throw light on the ætiology and mode of transmission of leishmaniosis.

Bibliography on Leishmaniosis in Palestine.

Kligler : "Oriental Sore in Palestine", *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 1923, Vol. 17, No. 5.

Dostravsky : "Ueber einen neuen endemischen Leishmaniaherd in Palestinien", *Archiv für Schiffs- und Tropenhygiene*, 1925, Vol. 29, pp. 101-111.

Adler and Theodor : "The Experimental Transmission of Cutaneous Leishmaniosis to Man from *Phlebotomus papatasis*" (*The Annals of Tropical Medicine and Parasitology*, Vol. XIX, No. 3, Sept. 30th, 1925).

P. A. Buxton : "Canine Leishmaniosis in Jerusalem" : Manuscript note (June 6th, 1923).

[2] Veterinary Society, April 30th, 1925.

C. H. 419 (*a*).

Annex 104.

RESOLUTIONS PASSED BY THE ADVISORY COUNCIL OF THE SINGAPORE BUREAU

during its First Session (January 4th to 6th, 1926).

I. The Advisory Council approves the Director's Report for 1925 subject to the modifications recorded in the Minutes.

II. The Advisory Council wishes to record its appreciation of the work of the Bureau during the first ten months of its existence, and to express its thanks to Dr. Brooke for the intelligence, energy and devotion with which he has organised and directed the Far Eastern Bureau, and to which must be ascribed the successful result obtained.

III. The Advisory Council, having considered the report of the Finance Sub-Committee and approved of it, recommends that the Budget of the Bureau for 1926 to the total sum of $69,761.00 be submitted to the Health Committee of the League for approval [1].

IV. The Advisory Council, having considered the report of the Code Sub-Committee (Appendix A), approves of the recommendations contained therein.

V. The Advisory Council:

Considering that the wireless transmission of the weekly bulletin in code, arranged through the generosity of the Government of French Indo-China from its station at Saigon, constitutes the most effective and economic means of communicating the weekly returns to all the interested sanitary administrations;

Considering that difficulties in the reception of the Saigon messages were experienced by numerous administrations;

Considering that several administrations succeeded in overcoming their difficulties;

Considering that the Public Health Commissioner of the Government of India made arrangements with the Director of Wireless for the re-broadcasting of the Bureau's weekly cable from the Bombay Station and that the message transmitted from Bombay to all India stations is picked up by a considerable number of these stations, and by ships at sea;

Considering that the extension of the wireless transmission would represent an enormous saving for the Bureau:

Decides:

That expert advice be obtained without delay as to the best methods for ensuring regularity and accuracy in the reception of the weekly wireless bulletins;

That the wireless bulletins be supplemented by cables only at the express desire of the interested administrations and whenever possible at their own expense (preferably by prepaid cables at Government rates);

That the credits recommended for cables in the estimates for 1926 should be curtailed in relation to the extension of the wireless transmission of bulletins;

That the *Weekly Fasciculus* should give regularly all relevant information regarding the transmission and reception by wireless of the Bureau's messages.

Invites all the administrations of the four groups of ports to supply the Bureau at the earliest possible moment with the following information:

(*a*) What difficulties, if any, are experienced in picking up the Saigon message ? (Give technical details.)

(*b*) What steps, if any, were taken to overcome the difficulties ? (Indicate technical methods employed.)

(*c*) Which other wireless stations are regularly picked up by your station ? (Indicate dates, hours, wave-lengths and all requisite technical details.)

(*d*) In particular, are the powerful European stations (St. Assise, Rugby, Nauen) in regular communication with your station ? (Give all technical details.)

(*e*) Does the application of the methods found effective by some of the stations (Appendix B) give the desired solution ?

(*f*) Can the messages re-broadcasted from Bombay at 09.00 and 17.00 G. M. T. each Friday after the weather message, on a wave-length of 2,000 meters, be picked up regularly or otherwise by your station ?

(*g*) What suggestions can be offered for improving the reception of the weekly wireless messages ?

[1] See Appendix C for detailed estimates.

VI. The Advisory Council:

Noting that the Director of the Bureau has been requested from time to time to give information about the work of the League of Nations in general and of its Health Organisation in particular, and considering it desirable that the Bureau should be enabled so far as practicable to supply such information, suggests that the Secretariat of the League might be invited to assist the Bureau in this respect, it being understood that such expenses as might be so incurred (supply of publications, etc.) would be a charge on the Secretariat of the League.

VII. The Advisory Council:

Considering that the International Health Organisation should include in its programme of activities the promotion of studies and investigations into the great problems of public health in the East;

Considering that the claims of malarial research in the Far East are already recognised by the Health Committee of the League;

Considering that the testing of the value of oral vaccination against acute intestinal infections is a matter of very considerable importance, and that in order to give conclusive results the tests should be carried out in several countries in accordance with a scheme of enquiry agreed upon by the participating national health administrations and medical research institutes;

Considering that the endemic foci of cholera in the Far East present the most favourable field for elucidating some of the unsolved problems of the epidemiology of this disease;

Considering that investigation into the rat-flea fauna of different countries with respect to plague is a matter of great importance as a basis for the formulation of methods of control of non-pneumonic plague and particularly for its control in ports;

Considering that the study of conditions surrounding the epidemiology of pneumonic plague with regard to its endemic centres is a matter of much importance;

Considering that tuberculosis constitutes one of the greatest problems in the Far East and that its prophylaxis by methods of preventive inoculation should be tested;

Recommends that a special expert committee or committees be set up, composed of directors of research and other experts of the several countries, in order to draw up a programme of study and to agree on the procedure to be followed for the intercommunication of results obtained and the mutual co-operation in the carrying out of the enquiry;

Proposes that the technical secretariat of the expert committee or committees be provided by the Health Organisation of the League.

VIII. The Advisory Council:

Having been informed by the Director, Health Section, League of Nations, that it should consider itself as part of the Far Eastern Commission of the Health Committee of the League of Nations;

Being convinced, after full discussion in open debate, that the Eastern Bureau, Singapore, is an integral part of the organisation of the Health Section, and that its present financial position of indebtedness to the generosity of the International Health Board of New York is a temporary one, which must soon cease;

Feels compelled to record that in its opinion the activities of the Bureau represent an essential part of the League, which should therefore assume financial responsibility for the functioning of the Bureau.

The Council is confirmed in this opinion by the desirability which it recognises, and to which it has given expression in a separate resolution, for the Health Section of the League of Nations to act internationally in regard to certain disease problems which pertain peculiarly to the Far East, and it has been further guided to this opinion by the fact that most of the administrations which are represented on it are full Members of the League on the allocation basis of first-class Powers.

IX. The Advisory Council:

Decides to appoint a President and five Vice-Presidents, who may meet during the interval between the sessions of the Council in order to discuss questions to be brought up before the Council for consideration and decision. The President and Vice-Presidents may formulate policies, which cannot become operative until deliberated upon and approved by the Council.

X. It was *resolved* that the member for India be elected President and that members for Indo-China, Netherlands East Indies, Siam, Japan and China be elected Vice-Presidents for 1926.

XI. The definition of a port was discussed and it was *decided* that the attention of the Paris International Sanitary Conference be directed to the necessity of including in the International Sanitary Convention a suitable definition of a port.

Appendix A.

MINUTES OF A SUB-COMMITTEE MEETING HELD AT THE BUREAU

on Monday, January 4th, 1926, at 5 p.m.

Present : Lt.-Col. J. D. GRAHAM (in the Chair), Dr. J. J. VAN LONKHUIJZEN and Dr. J. B. ADDISON.

1. The Committee, having considered the AA Code, is unanimously of the opinion:

(*a*) That it has worked satisfactorily since its inception, and that the services of a highly paid expert to examine the present code, or to elaborate a new one, are unnecessary;

(*b*) That the rapid increase in the telegraphic activities of the Bureau has necessitated such frequent and numerous augmentations to the code as to make written corrections cumbersome, and to necessitate its early revision.

2. The Committee, having examined the possibilities of revision, are agreed that the 600 combinations which are at present possible in a two-letter code will, if duplicated, amply suffice for future requirements. In the revised edition the general duplication of symbols has provided for present requirements and has allowed blanks for a sufficient number of future entries without need for the insertion of addenda slips.

3. The Committee is of the opinion that the revision should be proceeded with, on the basis proposed.

4. 525 copies of the first edition were issued at a cost of $522. With the frontispiece and map removed and a smaller format adopted, the Committee considers that the cost of production of a second edition will be less than that of the first.

5. On the basis of the previous distribution, an issue of 750 copies is recommended, at a probable cost of $600, and the Committee is of the opinion that the code, in addition to the administrative distribution, should also be on sale to approved applicants.

6. A proof copy of the suggested revision was examined, and it was decided that the issue should be bilingual, in French and English.

7. The Committee is of opinion that the omission of the names of clean ports from the weekly telegram might safely be adopted without danger to the clarity of the message; and, with a widespread absence of disease, such as obtained during the last three months of 1925, a saving of 20 per cent might be effected.

Appendix B.

MINUTES OF A SUB-COMMITTEE MEETING HELD AT THE BUREAU

on Thursday, January 7th, 1926, at 10 a.m.

Present : Dr. RAJCHMAN (in the Chair), Drs. VAN LONKHUIJZEN, DINGLE, L'HERMINIER and BROOKE.

The Council having agreed, during the course of its deliberations, that the matter of utilisation of wireless for messages should be examined by a wireless expert, the matter was duly considered, and it was thought advisable in the first instance to consider a list of the administrations with which the Bureau was in communication, and, secondly, to explore the communication possibilities to and from Saigon. Dr. Van Lonkhuijzen, in the course of discussion, was of opinion that the Saigon message could probably be re-broadcast without difficulty, but on what day and time, he was unable to say without enquiring. Col. Graham, whose assistance was solicited, stated that Bombay re-broadcast the Saigon message every Friday directly after the meteorological report.

The Sub-Committee then passed the following resolutions:

(1) That Dr. Van Lonkhuijzen will communicate to the Bureau as soon as possible information:

(*a*) as to the date, time and on what wave length the Saigon message can be rebroadcast;

(*b*) and, further, that he will furnish a list of the stations with which Bandoeng is in wireless communication.

(2) That Dr. L'Herminier will furnish a list to the Bureau as soon as possible of the stations with which Saigon is in wireless communication.

(3) That Dr. Dingle will obtain similar information with regard to the wireless installation in British North Borneo.

(4) That the Bureau shall send out as soon as possible a circular cable to all the ports with which it is at present in communication, asking for information as to whether they can pick up wireless messages from Saigon.

(5) That as soon as the information obtained as required by Resolution (1) has been received, it shall be circulated by cable from the Bureau to all the stations with the request to inform the Bureau after the receipt of the first two messages from Bandoeng whether or not they are picking it up.

(6) That the information received from ports in reply to both the circular cables will be communicated to Saigon and Java for their comments.

The meeting then adjourned.

Appendix C.

ESTIMATES OF THE EASTERN BUREAU, SINGAPORE, FOR THE YEAR 1926.

Establishment (per mensem).	S.S. Currency $	cts.
1. Director	300	00
2. Assistant Director[1] (550-25A-600)	600	00
Temporary Allowance 20%	120	00
3. Statistician (440-20A-480)	460	00
Temporary Allowance 20%	92	00
4. Financial Clerk Grade I (200-15A-230)	215	00
Temporary Allowance 15%	32	25
5. French-speaking Sten.-Typist[1] (170-15A-200)	170	00
Temporary Allowance 15%	25	50
6. Correspondence Clerk Grade I (170-15A-215)	170	00
Temporary Allowance 15%	25	50
7. Four Clerks Grade II (100-10A-120)	440	00
Temporary Allowance 15%	66	00
8. Two Peons (18-1A-20)	36	00
Temporary Allowance 15%	5	40
	$2,757	65

For 12 months	$33,091.80
Less—Asst. Director's and French Typist's salary for 2 months	1,831.00
	$31,260.80

Estimates for 1926.	$	cts.
Staff (as per Establishment)	31,261	00
Cables and Postage	25,000	00
Office Stationery	500	00
Printing	5,000	00
Rent, Electricity and Telephone	3,750	00
Periodicals	500	00
AA Cable Code (2nd Edition)—750 copies	600	00
Medical Attendance to Staff	200	00
Audit Fee	300	00
Miscellaneous	1,000	00
Passage Fund	1,000	00
	$69,111	00
Capital:		
Office Equipment (including " Roneo " duplicator)	400	00
Books of reference	250	00
Total Budget in S.S. Currency	$69,761	00

[Total Budget in Gold Dollars (at Exchange 57 %) = $39,763.77.]

[1] For 10 months only.

C. 268. 1926. III.
[C. H. 472.]

Annex 105.

RESOLUTIONS ADOPTED AT THE SIXTH SESSION OF THE HEALTH COMMITTEE.

I.

The Health Committee, having considered the resolution adopted in March 1926 by the Advisory Commission for the Protection and Welfare of Children and Young People, decides:

1. To thank the Advisory Commission for having transmitted to it for consideration and advice the programme which it has drawn up;

2. To ask the Health Section to collaborate with the Social Section in collecting and classifying the documentation desired by the Advisory Commission concerning legislation relating to the three questions dealing with the protection of infants (pre-natal services; infant welfare centres; the care of infants in their own families or placed out in institutions or in other homes);

3. To draw the attention of the Advisory Commission to the fact that the state of legislation dealing with these three questions would only give, in the majority of countries, an incomplete picture of the actual measures taken, and that consequently it would be desirable that the Secretariat should add to the documentation on the subject of legislation the collection of information regarding official and private organisations which deal with these matters;

4. To continue to collaborate with the Advisory Commission, through the intermediary of Professor Léon Bernard, who will represent the Health Committee on the Advisory Commission as well as on its Liaison Committee;

5. To empower the Medical Director to invite a limited number of experts or public health administrations to suggest, after study of the question, the directions which the Health Organisation of the League could most usefully follow in making international enquiries, in conformity with the resolution adopted by the Sixth Assembly;

6. To communicate this resolution to the Advisory Commission for the Protection and Welfare of Children and Young People.

II.

The Health Committee approves the Budget estimates for 1927 presented by the Budget Commission.

The Budget estimates for 1927 total 1,030,515 francs, as against 988,165 francs for 1926.

III.

The Health Committee authorises the Medical Director to get officially into touch with the International Institute of Statistics in order to ascertain, with the Institute, the possible basis for co-operation in the preparatory work entailed by the revision of the International List of Causes of Death to be dealt with by the future Conference.

IV.

The Health Committee places on record its grateful appreciation of the arrangements made by the Japanese Government for the Interchange of Health Officers in Japan and of the hospitality and kindness extended to the participants.

V.

The Health Committee,

Having considered the report of the Medical Director on his tour in the Far East,

Approves the suggestions made to secure liaison between public health activity in Japan and the work of the Health Organisation of the League,

And notes from the information given that the credits available in the 1926 Budget enable this programme to be carried out.

VI.

The Health Committee,

Having considered the resolutions presented to it by the Advisory Council of the Eastern Bureau and the Minutes of the meeting held in Singapore, January 4th to 6th, 1926:

1. Approves the Budget estimates for the year 1926 passed by the Advisory Council, amounting to 69,761 Straits dollars (39,763.77 gold dollars) (Resolution III of the Advisory Council);

2. Desires to express its special thanks and appreciation to the following Administrations, on whose behalf their delegates at the Singapore meeting of the Council made promises of financial assistance to the current expenses of the Bureau as stated below:

The Government of:

The Straits Settlements . .	5,000 Straits dollars (for 1926)
Siam	2,000 Straits dollars (for 1926)
The Philippine Islands . .	5,000 Straits dollars (for 1927)
Japan	from 7,000 to 10,000 yen (for 1926)
French Indo-China	6,000 piasters (for 1926)
Hong-Kong	up to 5,000 Straits dollars (for 1927)
China	2,000 Straits dollars (for 1926)
Netherlands East Indies .	sum not stated for 1926

and recommends the acceptance of these offers;

3. Wishes to express its thanks and appreciation to the following Administrations, which are contributing to the efficient working of the Bureau by broadcasting free of charge in code the Bureau's weekly epidemiological report:

The Government of:

French Indo-China, broadcasting from .	Saigon
Netherlands East Indies, broadcasting from	Malabar (Java)
British North Borneo, broadcasting from	Sandakan.
British India, broadcasting from	Bombay, Madras, Calcutta, Karachi;

4. Associates itself with Resolution II adopted by the Advisory Council, which contains a just appreciation of the services rendered by Dr. Brooke, the Director, in organising and developing the work of the Bureau;

5. Takes note of Resolutions I, IV, V, VI, VIII, IX, X and XI adopted by the Advisory Council;

6. Notes with interest the recommendation contained in Resolution VII concerning the creation of expert committees to co-ordinate research in the Far East in public health questions of great international importance;

Decides to proceed at once, in consultation with the Administrations concerned, to the constitution of an Expert Committee to deal with the question of the administration by mouth of vaccines against acute intestinal infections, to consist of directors of research institutes in those countries where enquiries of this nature are actually in progress or about to be undertaken, with the addition of experts from Western countries selected for their special competence in this matter;

Invites the Medical Director to obtain from the members of the Advisory Council of the Eastern Bureau further information regarding the other suggested subjects for co-ordinated research for which the creation of expert committees was recommended.

VII.

The Health Committee adopts the report of the Malaria Commission.

VIII.

The Health Committee,

Having considered the report on leprosy presented by Professor Chagas,

Decides to ask Professor Chagas to continue his study of problems relating to the epidemiology and prevention of leprosy in collaboration with experts designated for this purpose in agreement with the Bureau of the Health Committee.

IX.

The Health Committee adopts the report of the Medical Director on the work accomplished since the fifth session of the Committee (October 1925 to April 1926).

X.

The Health Committee decides to take steps to convene in 1927 at the Pasteur Institute in Paris an International Conference on Rabies to which the directors of the chief anti-rabic institutes of the world will be invited.

XI.

The Health Committee adopts the report of the Tuberculosis Commission and desires to express to Professor Calmette its appreciation of his report on the Titration of Tuberculin.

XII.

The Health Committee approves the regulations concerning the award of a prize for malaria research in memory of the late Dr. S. T. Darling.

XIII.

The Health Committee,

Has studied Dr. L. Raynaud's communication on the observations made during the tour of Mediterranean ports made by port sanitary officers and the memorandum presented by the Advisory and Technical Committee for Communications and Transit of the League of Nations on sanitary problems concerning maritime navigation (document C.C.T. 209);

Considers that interchanges of port health officers should be repeated and that, wherever experience has shown that successful methods of deratisation of ships have been secured, directors of port sanitary administrations should be invited to attend tests of these methods so as to enable them to train their personnel in carrying them out.

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[Communiqué aux Membres du Conseil.]

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[C. H. 472 (1).]

Genève, le 21 mai 1926.

SOCIÉTÉ DES NATIONS

Rapport sur les Travaux de la Sixième Session

DU

COMITÉ D'HYGIÈNE

tenue à Genève du 26 avril au 1er mai 1926.

LEAGUE OF NATIONS

Report on the Work of the Sixth Session

OF THE

HEALTH COMMITTEE

Held at Geneva from April 26th to May 1st, 1926.

Publications of the League of Nations
III. HYGIÈNE
1926. III. 12.

Les résolutions dont il est fait mention dans ce rapport ont déjà été communiquées aux Membres du Conseil dans le document C. 268.1926.III.

I.

Le Comité d'hygiène, ayant pris connaissance de la résolution adoptée en mars 1926 par la Commission consultative pour la protection de l'enfance et de la jeunesse, décide:

1. De remercier la Commission consultative de lui avoir transmis, aux fins d'examen et de toutes suggestions utiles, le plan d'action qu'elle a déterminé;

2. De charger la Section d'hygiène de collaborer avec la Section sociale pour recueillir et classer la documentation réclamée par la Commission consultative sur la législation relative à trois questions afférentes à la protection de l'enfance (centres prénataux, consultations de nourrissons, surveillance de l'enfant placé dans sa famille ou en dehors de sa famille, dans des institutions ou autres établissements);

3. D'attirer instamment l'attention de la Commission consultative sur le fait que l'état de la législation visant ces trois questions ne donnerait, dans la plupart des pays, qu'un tableau complètement infidèle de la situation exacte des mesures prises et qu'il y aurait donc lieu, pour le Secrétariat, de joindre à la documentation sur la législation celle qui renseignera sur les organisations publiques et privées existant dans ce domaine;

4. De continuer à collaborer avec la Commission consultative par l'intermédiaire du professeur Léon Bernard, qui représentera le Comité d'hygiène à la Commission consultative et au Comité de liaison institué par elle;

5. De charger le Directeur médical d'inviter un nombre restreint d'experts ou d'administrations d'hygiène publique à indiquer, après étude de la question, les voies dans lesquelles l'Organisation d'hygiène de la Société des Nations devrait, de préférence, s'engager pour entreprendre une enquête internationale conformément à la résolution adoptée par la sixième Assemblée;

6. De communiquer la présente résolution à la Commission consultative pour la protection de l'enfance et de la jeunesse.

II.

Le Comité d'hygiène approuve les prévisions budgétaires pour 1927 telles qu'elles ont été établies par la Commission du budget. Leur montant s'élève à 1.030.515 francs en 1927 contre 988.165 francs en 1926.

III.

Le Comité d'hygiène qui, au cours de sa cinquième session, avait décidé d'inclure au nombre de ses travaux l'étude de la revision de la nomenclature des causes de décès et avait chargé le Directeur médical d'entreprendre cette étude, en relation avec toute organisation compétente, fut avisé que l'Institut international de statistique se proposait de réunir, en 1929, une conférence ayant le même objet.

L'Institut international ayant exprimé son intention de former un comité d'experts pour la préparation de la future conférence, il semblait indiqué, pour éviter de doubles emplois, qu'il eût recours dans ce but à la compétence du Comité d'hygiène, qui avait déjà abordé la question de la revision des causes de décès.

Dans ces conditions, le Comité d'hygiène a estimé qu'il conviendrait d'étudier, de concert avec l'Institut international de statistique, le mode de collaboration qui pourrait être établi, et il a formulé la résolution suivante:

> Le Comité d'hygiène autorise le Directeur médical à entrer officiellement en rapport avec l'Institut international de statistique en vue de rechercher, avec celui-ci, les bases d'une collaboration pour le travail préparatoire de la revision de la nomenclature des causes de décès destinée à la conférence future.

S. d. N. 1050 5/26. Im. Kundig.

The resolutions to which reference is made in this report have already been communicated to the Members of the Council in document C. 268.1926.III.

I.

The Health Committee, having considered the resolution adopted in March 1926 by the Advisory Commission for the Protection and Welfare of Children and Young People, decides:

1. To thank the Advisory Commission for having transmitted to it for consideration and advice the programme which it has drawn up;

2. To ask the Health Section to collaborate with the Social Section in collecting and classifying the documentation desired by the Advisory Commission concerning legislation relating to the three questions dealing with the protection of infants (pre-natal services; infant welfare centres; the care of infants in their own families or placed out in institutions or in other homes);

3. To draw the attention of the Advisory Commission to the fact that the state of legislation dealing with these three questions would only give, in the majority of countries, an incomplete picture of the actual measures taken, and that consequently it would be desirable that the Secretariat should add to the documentation on the subject of legislation the collection of information regarding official and private organisations which deal with these matters;

4. To continue to collaborate with the Advisory Commission, through the intermediary of Professor Léon Bernard, who will represent the Health Committee on the Advisory Commission as well as on its Liaison Committee;

5. To empower the Medical Director to invite a limited number of experts or public health administrations to suggest, after study of the question, the directions which the Health Organisation of the League could most usefully follow in making international enquiries, in conformity with the resolution adopted by the Sixth Assembly;

6. To communicate this resolution to the Advisory Commission for the Protection and Welfare of Children and Young People.

II.

The Health Committee approves the Budget estimates for 1927 presented by the Budget Commission.

The Budget estimates for 1927 total 1,030,515 francs, as against 988,165 francs for 1926.

III.

The Health Committee decided during its Fifth Session to include in its agenda the revision of the International List of Causes of Death, and instructed the Medical Director to undertake the study of this question in conjunction with any competent organisation. The Committee has since been notified that the International Institute of Statistics proposed to summon a conference in 1929 for the same purpose. As the International Institute has expressed the intention of forming a committee of experts for the preparation of this conference, it seemed advisable that, in order to avoid duplication, the Institute should have recourse to the assistance of the Health Committee, which has already begun to study the question of the revision of Causes of Death.

In these circumstances, the Health Committee decided that it would be well to consider, in conjunction with the International Institute of Statistics, how the two bodies could co-operate, and it adopted the following resolution:

The Health Committee authorises the Medical Director to get officially into touch with the International Institute of Statistics in order to ascertain, with the Institute, the possible basis for co-operation in the preparatory work entailed by the revision of the International List of Causes of Death to be dealt with by the future Conference.

IV.

Du 18 octobre au 4 décembre 1925, un voyage d'études réservé aux fonctionnaires médicaux des administrations sanitaires d'Extrême-Orient s'est poursuivi au Japon, en Mandchourie et en Corée. Grâce à la générosité du Gouvernement japonais et de l'Administration des chemins de fer de Mandchourie, le transport gratuit par voie ferrée avait été accordé aux participants; en outre, le Gouvernement japonais avait pris soin de préparer à leur intention une brochure très détaillée sur l'Organisation et l'Administration des Services d'hygiène publique, tant au Japon qu'en Mandchourie et en Corée.

En reconnaissance de l'appui prêté par le Gouvernement japonais pendant toute la durée du voyage et qui a permis une réussite si complète de cet échange, le Comité d'hygiène a adopté la résolution suivante:

> Le Comité d'hygiène désire exprimer au Gouvernement japonais sa gratitude pour les arrangements qu'il a bien voulu prendre en vue de faciliter l'échange de personnel sanitaire au Japon, ainsi que pour son hospitalité et son amabilité envers les participants à cet échange.

V.

Sur l'invitation du Gouvernement japonais, le Directeur médical a séjourné au Japon en novembre 1925 et il a été à même de constater l'intérêt que suscitent, tant parmi les hauts fonctionnaires d'hygiène publique que parmi le corps médical, les travaux accomplis en matière d'hygiène par la Société des Nations. Les multiples activités de l'Organisation d'hygiène sont suivies de près par les spécialistes japonais, dont certains seraient désireux de participer aux études techniques poursuivies par les commissions. Dans le but d'assurer une collaboration permanente du Japon avec l'Organisation d'hygiène, une Commission de coordination comprenant des représentants du Service sanitaire central japonais et des principaux instituts scientifiques a été créée. Le plan d'action que cette commission a soumis à l'examen du Comité d'hygiène comprend:

1° La publication, par les soins de l'Organisation d'hygiène, de monographies exposant les recherches originales récemment effectuées par des savants japonais sur des problèmes d'hygiène d'importance internationale;

2° La nomination de membres correspondants japonais au sein des diverses Commissions instituées par le Comité d'hygiène;

3° L'allocation de bourses individuelles à des spécialistes occidentaux s'occupant de médecine expérimentale et d'hygiène publique pour leur permettre de se rendre au Japon, afin d'y poursuivre des recherches spéciales dans les instituts scientifiques de ce pays, et, réciproquement, l'octroi à des spécialistes japonais de bourses pour leur permettre d'étudier en Occident certains problèmes sanitaires intéressant le Japon;

4° L'envoi d'un professeur japonais en Europe pour y faire connaître, dans deux ou trois centres scientifiques importants, les résultats de l'expérience acquise par le Japon dans le domaine de l'hygiène publique.

Nanti de ces propositions, le Comité d'hygiène adopta la résolution suivante:

> Le Comité d'hygiène,
>
> Ayant pris connaissance du rapport du Directeur médical sur son voyage en Extrême-Orient,
>
> Approuve les suggestions faites en vue d'assurer une liaison entre l'activité déployée au Japon en matière d'hygiène publique et celle de l'Organisation d'hygiène de la Société des Nations,
>
> Et est heureux d'apprendre que, selon les informations reçues, les crédits portés au budget de 1926 permettent de mener à bien ce programme.

VI.

Le Bureau de renseignements épidémiologiques de l'Extrême-Orient, fondé à Singapour par l'Organisation d'hygiène, avec le généreux concours de l'« International Health Board » de la Fondation Rockefeller, a commencé à fonctionner le 1er mars 1925.

Dans sa session de juin 1925, le Conseil de la Société des Nations avait adopté une résolution qui lui était soumise par le Comité d'hygiène et qui tendait à la création d'un comité consultatif qui fonctionnerait auprès du Bureau de Singapour à titre de Commission spéciale du Comité d'hygiène; cette commission serait composée d'un ou plusieurs représentants de ce comité, ainsi que d'un délégué de chacune des administrations sanitaires qui avaient été invitées à participer à la Conférence de Singapour (février 1925), où fut décidée la création du Bureau de l'Extrême-Orient.

IV.

From October 18th to December 4th, 1925, a study tour for the medical officers of the health administrations of the Far East was carried out in Japan, Manchuria and Korea. Owing to the generosity of the Japanese Government and of the Manchurian Railway Administration, those taking part in the interchange were allowed to travel by rail free of charge; in addition, the Japanese Government prepared for their use a very detailed handbook on the organisation and administration of the public health services in Japan, Manchuria and Korea.

In recognition of the assistance given by the Japanese Government during the whole course of the journey, which so largely contributed to the success of the interchange, the Health Committee adopted the following resolution:

The Health Committee places on record its grateful appreciation of the arrangements made by the Japanese Government for the Interchange of Health Officers in Japan and of the hospitality and kindness extended to the participants.

V.

On the invitation of the Japanese Government, the Medical Director stayed in Japan in November 1925 and was able to observe the interest taken in the health work of the League of Nations both by the higher public health officials and by the medical profession. The many activities of the Health Organisation are closely followed by the Japanese specialists, some of whom would be glad to take part in the technical studies carried out by the commissions. In order to ensure permanent co-operation between Japan and the Health Organisation, a Co-ordination Commission, consisting of representatives of the Central Japanese Health Service and of the principal scientific institutes, has been set up. The programme which this commission has submitted for the Health Committee's consideration includes:

1. Publication by the Health Organisation of monographs on original research recently carried out by Japanese scientists on health problems of international importance.

2. Appointment of Japanese corresponding members to take part in the work of the various commissions set up by the Health Committee.

3. Award of individual fellowships to Western public health and medical research workers, who would go to Japan to study at a Japanese institution, and in exchange the award of fellowships to Japanese specialists to enable them to study in the West certain health problems of importance to Japan.

4. A Japanese professor to be invited to lecture at two or three centres in Europe on Japanese scientific experience in public health problems.

These proposals were laid before the Health Committee, which adopted the following resolution:

The Health Committee,

Having considered the report of the Medical Director on his tour in the Far East,

Approves the suggestions made to secure liaison between public health activity in Japan and the work of the Health Organisation of the League,

And notes from the information given that the credits available in the 1926 Budget enable this programme to be carried out.

VI.

The Eastern Epidemiological Intelligence Bureau, founded at Singapore by the Health Organisation with the generous help of the International Health Board of the Rockefeller Foundation, began its work on March 1st, 1925.

At its session in June 1925, the Council of the League of Nations adopted a resolution submitted to it by the Health Committee with regard to the creation of an Advisory Council to be attached to the Singapore Bureau as a special commission of the Health Committee; this commission was to consist of one or more representatives of the Committee and of a delegate of each of the Health Administrations which had been invited to take part in the Singapore Conference (February 1925) at which it was decided to set up the Eastern Bureau.

En vertu de cette décision du Conseil, le Comité consultatif du Bureau de renseignements épidémiologiques d'Extrême-Orient fut institué et il tint sa première réunion à Singapour, du 4 au 6 janvier 1926. Il réunissait des délégués de douze administrations sanitaires d'Extrême-Orient. Après avoir approuvé le rapport du directeur du Bureau pour 1925 (Résolution I), le Comité consultatif donna son assentiment aux recommandations formulées par la sous-commission qui avait eu à examiner le code télégraphique utilisé pour la transmission des renseignements épidémiologiques du Bureau (Résolution IV), ainsi qu'aux suggestions techniques de nature à faciliter la diffusion de ces renseignements par T.S.F. (Résolution V).

Considérant qu'il était désirable que le Bureau pût répondre aux demandes d'informations relatives à l'œuvre de la Société des Nations, en général, et à celle de son Organisation d'hygiène, en particulier, le Comité consultatif proposa que le Secrétariat de la Société des Nations fût invité à aider le Bureau dans cette tâche (Résolution VI).

Etant donné l'intérêt que présenterait le développement des études et des recherches touchant aux grands problèmes intéressant l'hygiène publique en Extrême-Orient, tels que l'étude du paludisme, de la tuberculose et des foyers endémiques de choléra et de peste, ou la recherche de l'efficacité de la vaccination par voie buccale contre les infections intestinales aiguës, le Comité consultatif recommanda que des comités d'experts fussent constitués, qui comprendraient les directeurs des Instituts de recherches de plusieurs pays, en vue d'établir un plan d'études sur ces différents sujets (Résolution VII).

Enfin, le Comité consultatif décida de nommer un président et cinq vice-présidents (Résolutions IX et X) et d'attirer l'attention de la future Conférence sanitaire internationale (Paris, mai 1926) sur l'utilité qu'il y aurait à définir dans les termes de la Convention ce que l'on doit entendre par le mot « port » (Résolution XI).

Le Comité d'hygiène,

Ayant pris connaissance des résolutions que lui a soumis le Comité consultatif du Bureau de l'Extrême-Orient et des procès-verbaux de la session que ce Comité a tenue à Singapour du 4 au 6 janvier 1926:

1º Approuve les prévisions bugdétaires pour 1926 qui ont été établies par le Comité consultatif et qui s'élèvent à la somme de 69.761 Straits dollars (39.763,77 dollars-or) (Résolution III du Comité consultatif);

2º Désire exprimer tout spécialement ses remerciements et sa gratitude aux administrations des pays qui ont bien voulu autoriser leurs délégués à la session du Comité, tenue à Singapour, à promettre une assistance financière pour couvrir les dépenses courantes du Bureau, à savoir:

Gouvernements.	
Etablissements des Détroits . .	5.000 Straits dollars (pour 1926)
Siam.	2.000 Straits dollars (pour 1926)
Iles Philippines	5.000 Straits dollars (pour 1927)
Japon	de 7.000 à 10.000 yen (pour 1926)
Indochine Française	6.000 piastres (pour 1926)
Hong-Kong	jusqu'à 5.000 Straits dollars (pour 1927)
Chine	2.000 Straits dollars (pour 1926)
Indes Orientales Néerlandaises.	somme non encore fixée (pour 1926)

et recommande d'accepter ces offres;

3º Désire adresser ses remerciements aux administrations qui contribuent à rendre efficace l'œuvre entreprise par le Bureau en transmettant gratuitement par T. S. F., en langage chiffré, le *Bulletin épidémiologique hebdomadaire* du Bureau. Ces administrations sont celles des pays suivants:

Gouvernements.	Station d'émission.
Indochine Française	Saïgon
Indes Orientales Néerlandaises. .	Malabar (Java)
Nord-Bornéo Britannique. . . .	Sandakan
Indes Anglaises	Bombay, Madras, Calcutta, Karachi;

4º S'associe aux termes de la résolution II, telle qu'elle fut adoptée par le Comité consultatif, qui rend hommage aux services rendus en faveur de l'organisation et du développement de l'œuvre du Bureau par son directeur, le Dr G. Brooke;

5º Prend acte des résolutions I, IV, V, VI, VIII, IX, X et XI adoptées par le Comité consultatif;

6º Enregistre avec intérêt la recommandation contenue dans la résolution VII relative à la création de Comités d'experts en vue de coordonner en Extrême-Orient les recherches relatives à des questions d'hygiène publique présentant une importance internationale;

Décide de procéder de suite, et en consultation avec les administrations intéressées, à la constitution d'un Comité d'experts chargé d'étudier la question de la vaccination par voie buccale contre les infections intestinales aiguës. Ce Comité d'experts sera formé des Direc-

In pursuance of this decision of the Council, the Advisory Council of the Far Eastern Epidemiological Intelligence Bureau was set up and held its first meeting at Singapore from January 4th to 6th, 1926. It was attended by the delegates of twelve Far-Eastern health administrations. After approving the report of the Director of the Bureau for 1925 (Resolution I), the Advisory Council approved the recommendations of the Sub-Committee appointed to examine the telegraphic code used for the transmission of the Bureau's epidemiological intelligence (Resolution IV) and the technical suggestions put forward for facilitating the transmission of its wireless bulletins (Resolution V).

Considering it desirable that the Bureau should be enabled to comply with requests for information about the work of the League in general and of its Health Organisation in particular, the Advisory Council proposed that the Secretariat of the League should be invited to assist the Bureau in this respect (Resolution VI).

Considering the importance of the promotion of studies and investigations of the great problems of public health in the East, such as the investigation of malaria, tuberculosis and the endemic foci of cholera and plague, also the testing of the value of oral vaccination against acute intestinal infections, the Advisory Council recommended that committees of experts should be set up composed of the Directors of the Research Institutes of several countries in order to draw up a programme of study on these various subjects (Resolution VII).

Finally, the Advisory Council decided to appoint a president and five vice-presidents (Resolutions IX and X), and to direct the attention of the forthcoming International Sanitary Conference (Paris, May 1926) to the advisability of including in the International Sanitary Convention a suitable definition of a port (Resolution XI):

The Health Committee,

Having considered the resolutions presented to it by the Advisory Council of the Eastern Bureau and the Minutes of the meeting held in Singapore, January 4th to 6th, 1926:

1. Approves the Budget estimates for the year 1926 passed by the Advisory Council, amounting to 69,761 Straits dollars (39,763.77 gold dollars) (Resolution III of the Advisory Council);

2. Desires to express its special thanks and appreciation to the following Administrations, on whose behalf their delegates at the Singapore meeting of the Council made promises of financial assistance to the current expenses of the Bureau as stated below:

The Government of:

The Straits Settlements	5,000 Straits dollars (for 1926)
Siam	2,000 Straits dollars (for 1926)
The Philippine Islands	5,000 Straits dollars (for 1927)
Japan	from 7,000 to 10,000 yen (for 1926)
French Indo-China	6,000 piasters (for 1926)
Hong-Kong	up to 5,000 Straits dollars (for 1927)
China	2,000 Straits dollars (for 1926)
Netherlands East Indies	sum not stated for 1926

and recommends the acceptance of these offers;

3. Wishes to express its thanks and appreciation to the following Administrations, which are contributing to the efficient working of the Bureau by broadcasting free of charge in code the Bureau's weekly epidemiological report:

The Government of:

French Indo-China, broadcasting from	Saigon
Netherlands East Indies, broadcasting from	Malabar (Java)
British North Borneo, broadcasting from	Sandakan.
British India, broadcasting from	Bombay, Madras, Calcutta, Karachi;

4. Associates itself with Resolution II adopted by the Advisory Council, which contains a just appreciation of the services rendered by Dr. Brooke, the Director, in organising and developing the work of the Bureau;

5. Takes note of Resolutions I, IV, V, VI, VIII, IX, X and XI adopted by the Advisory Council;

6. Notes with interest the recommendation contained in Resolution VII concerning the creation of expert committees to co-ordinate research in the Far East in public health questions of great international importance;

Decides to proceed at once, in consultation with the Administrations concerned, to the constitution of an Expert Committee to deal with the question of the administration by mouth of vaccines against acute intestinal infections, to consist of directors of research

teurs des Instituts de recherches des pays où des enquêtes de ce genre sont actuellement poursuivies ou sont sur le point de l'être; il lui sera adjoint quelques experts particulièrement compétents, appartenant à des pays occidentaux.

Invite le Directeur médical à recueillir auprès des membres du Comité consultatif du Bureau de l'Extrême-Orient des renseignements plus complets sur les autres sujets d'étude qui ont été proposés comme devant faire l'objet de recherches coordonnées pour lesquelles la création d'un Comité d'experts a été recommandée par le Conseil consultatif.

VII.

Le plan des travaux de la Commission du paludisme, que le Conseil avait apprrouvé, lors de sa session de décembre 1925, a déjà été exécuté dans certaines de ses parties; il est en voie de réalisation dans d'autres.

Dans le rapport qu'il a présenté au Comité d'hygiène, le président de la Commission du paludisme a exposé quel était l'état d'avancement des travaux.

En ce qui concerne les voyages d'études, le rapport sur le voyage que la Commission a effectué au début de l'automne dernier, en Espagne, a été définitivement approuvé et sera publié à bref délai.

Pour 1926, deux voyages d'études sont prévus; d'une part, la visite des travaux effectués dans certaines régions impaludées des Etats-Unis d'Amérique, d'autre part, l'étude des travaux d'assainissement accomplis en Sicile.

Une étude portant sur les relations existant entre l'anophélisme et le delta de certains grands fleuves, tels que l'Ebre, le Pô et le Danube, est actuellement en cours.

Dans le domaine des recherches de laboratoire, un mémoire fort intéressant a été présenté à la Commission par un de ses membres, le colonel S. P. James, du Ministère britannique de l'Hygiène; y sont relatées les expériences poursuivies en Angleterre en vue de maintenir un stock de moustiques infectés par le plasmode du paludisme, afin de permettre le traitement de la paralysie générale par le paludisme intentionnellement provoqué.

Les essais tendant à substituer à l'emploi de la quinine celui de certains alcaloïdes secondaires du quinquina, dont le prix de revient serait moindre, ont été poursuivis dans un certain nombre d'hôpitaux d'Algérie, d'Espagne, d'Italie, de Roumanie et du Royaume des Serbes, Croates et Slovènes, selon les directives établies par la Commission du paludisme. Il serait prématuré de vouloir exprimer un jugement définitif sur la valeur thérapeutique de ces alcaloïdes.

Les cours destinés au perfectionnement de jeunes malariologues ont été organisés dans les Instituts de médecine tropicale de Paris, Londres et Hambourg. Ces cours théoriques seront suivis d'un stage d'application pratique dans des stations antimalariques de Corse, d'Espagne, d'Italie et du Royaume des Serbes, Croates et Slovènes.

Enfin, l'étude des relations susceptibles d'exister entre les conditions climatériques et météorologiques, d'une part, et le paludisme, de l'autre, sera poursuivie dans des stations antipalustres italiennes et espagnoles situées à proximité immédiate d'un centre de renseignements météorologiques.

Après avoir reçu communication du rapport qui lui était présenté sur les travaux de la Commission du paludisme, le Comité d'hygiène a formulé la résolution suivante:

Le Comité d'hygiène adopte le rapport de la Commission du paludisme.

VIII.

Après avoir exposé au Comité d'hygiène l'importance que revêtait, du point de vue médico-social, le problème de la lèpre en se fondant sur les statistiques relatives à divers pays, le professeur Chagas insista tout particulièrement sur l'intérêt qu'il y aurait à connaître le mécanisme exact de la contagion, mécanisme qui constitue, à son avis, le point essentiel du problème de la lèpre.

Etant donné le caractère nettement international de cette question, le professeur Chagas suggéra au Comité d'hygiène de désigner des spécialistes dans certains pays et de les charger d'aborder l'étude de ce problème. Pour donner suite à cette proposition, le Comité d'hygiène adopta la résolution suivante:

Le Comité d'hygiène,

Ayant pris connaissance du rapport présenté par le professeur Chagas sur le problème de la lèpre,

Décide de charger le professeur Chagas de continuer son étude de certains problèmes relatifs à l'épidémiologie et à la prophylaxie de la lèpre, en collaboration avec des experts désignés à cet effet, d'accord avec le Bureau du Comité.

IX.

Le Comité d'hygiène adopte le rapport du Directeur médical sur les travaux accomplis depuis la cinquième session du Comité (octobre 1925 à avril 1926).

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institutes in those countries where enquiries of this nature are actually in progress or about to be undertaken, with the addition of experts from Western countries selected for their special competence in this matter;

Invites the Medical Director to obtain from the members of the Advisory Council of the Eastern Bureau further information regarding the other suggested subjects for co-ordinated research for which the creation of expert committees was recommended.

VII.

The programme of the Malaria Commission, which the Council approved at its session of December, 1925, has already been put into practice as regards some of its items and is in process of application as regards others.

In the report which he submitted to the Health Committee, the Chairman of the Malaria Commission explained the stage which had been reached in the Commission's work.

As regards the study tours, the report on the journey made by the Commission at the beginning of last autumn in Spain has been finally approved and will shortly be published.

Two study tours have been arranged for 1926; the first to visit the work carried out in certain malaria districts of the United States and the second to study the sanitation works in Sicily.

An investigation into the relations between anophelism and the deltas of certain large rivers such as the Ebro, the Po and the Danube is now being made.

In laboratory research, a very interesting memorandum was submitted to the Commission by one of its members, Colonel S. P. James, of the British Health Ministry, which gives an account of the experiments made in England with a view to keeping a stock of mosquitoes infected with the malaria plasmodium for the treatment of general paralysis by induced malaria.

Experiments for substituting for quinine certain of the secondary alkaloids of cinchona whose cost of production is smaller have been carried out in a certain number of hospitals in Algeria, Spain, Italy, Roumania and the Kingdom of the Serbs, Croats and Slovenes on the lines laid down by the Malaria Commission. It would be premature to attempt to pass a final judgment on the therapeutic value of these alkaloids.

Courses for the advanced training of malariologists have been organised in the Tropical Medicine Institutes of Paris, London and Hamburg. These theoretical courses will be followed by a practical course in the anti-malaria stations of Corsica, Spain, Italy and the Kingdom of the Serbs, Croats and Slovenes.

Lastly, an investigation into the relations which may exist between climatic and meteorological conditions and malaria will be carried and in Italian out Spanish anti-malaria stations situated in the immediate vicinity of meteorological information centres.

After considering the reports submitted to it on the work of the Malaria Commission, the Health Committee passed the following resolution:

The Health Committee adopts the report of the Malaria Commission.

VIII.

After drawing the Health Committee's attention to the importance of the problem of leprosy from the medico-social point of view as shown by the statistics of various countries, Professor Chagas laid special emphasis on the value of ascertaining the exact method of contagion, which in his opinion constitutes the essential factor of the leprosy problem.

In view of the definitely international character of this question, Professor Chagas suggested that the Health Committee should appoint specialists in certain countries to make an investigation. In pursuance of this proposal the Health Committee adopted the following resolution:

The Health Committee,

Having considered the report on leprosy presented by Professor Chagas,

Decides to ask Professor Chagas to continue his study of problems relating to the epidemiology and prevention of leprosy in collaboration with experts designated for this purpose in agreement with the Bureau of the Health Committee.

IX.

The Health Committee adopts the report of the Medical Director on the work accomplished since the fifth session of the Committee (October 1925 to April 1926).

X.

A plusieurs reprises déjà, au cours des deux dernières années, des demandes avaient été adressées au président du Comité d'hygiène ou au Directeur médical, tendant à ce que l'Organisation d'hygiène abordât, du point de vue international, l'étude du problème que pose le traitement de la rage. Etant donné l'importance des propositions qui lui étaient soumises, le président du Comité d'hygiène estima qu'il était nécessaire de pressentir l'Institut Pasteur de Paris au sujet de l'opportunité qu'il y aurait à réunir une Conférence internationale de la rage. Dans ce but, il se mit en rapport avec M. le professeur Calmette, directeur-adjoint de l'Institut Pasteur, qui se déclara en tous points favorable à la convocation d'une semblable Conférence et estima que, seul, le Comité d'hygiène était en mesure de provoquer cette réunion et d'élaborer le programme des travaux qui pourraient y être effectués. Il formula, en outre, le vœu que, selon le désir exprimé par l'Institut Pasteur, la future Conférence internationale de la rage tienne ses assises à Paris, dans la maison même de Pasteur.

Etant donné ces considérations, le Comité d'hygiène adopta la résolution suivante:

> Le Comité d'hygiène décide de prendre les dispositions nécessaires en vue de la convocation, en 1927, à l'Institut Pasteur de Paris, d'une Conférence internationale de la rage qui réunira les directeurs des principaux Instituts antirabiques du monde.

XI.

Les travaux de la Commission de la tuberculose se sont poursuivis dans deux directions: d'une part, l'étude d'ordre statistique, qui avait été entreprise en France et en Scandinavie sur la mortalité tuberculeuse, se continue selon les directives précédemment établies. D'autre part, pour donner suite à une proposition du D[r] Tsurumi, président de la Commission de la tuberculose, le professeur Calmette, directeur-adjoint de l'Institut Pasteur de Paris, avait bien voulu entreprendre une étude expérimentale des différents procédés utilisés pour le titrage des tuberculines, dans l'espoir d'arriver à un titrage international, unique et uniforme. Dans la remarquable mise au point de la question qu'il a présentée au Comité d'hygiène, le professeur Calmette arrive à la conclusion que, malgré les nombreux procédés de titrage existants, il serait, sans doute, prématuré de proposer l'adoption de règles internationales pour la mesure de l'activité des tuberculines et qu'il importerait que leur titrage fît encore l'objet de recherches expérimentales. Toutefois, il préconise l'adoption d'une tuberculine-étalon comme unité de comparaison et décrit les méthodes qui devraient, de préférence, être utilisées pour le titrage.

Désireux de souligner l'importance qu'il attachait à voir le professeur Calmette collaborer à ses travaux, le Comité d'hygiène a adopté la résolution suivante:

> Le Comité d'hygiène adopte le rapport de la Commission de la tuberculose et décide d'exprimer à M. le professeur Calmette sa plus vive gratitude pour son mémoire sur le titrage des tuberculines.

XII.

Le Conseil se souviendra qu'au cours de sa trente-sixième session, il a tenu à honorer publiquement la mémoire des victimes de l'accident qui s'est produit à Beyrouth, le 21 mai 1925, et qui a coûté la vie aux docteurs Darling et Lothian, ainsi qu'à M[lle] Besson, au cours d'un voyage que la Commission du paludisme effectuait en Syrie. Lors de sa cinquième session, le Comité d'hygiène a décidé de recueillir, par souscriptions privées, un fonds-capital dont les arrérages seraient utilisés pour l'établissement d'un prix périodique qui porterait le nom de *prix Darling*. Les statuts de cette fondation prévoient que le prix, consistant en une médaille de bronze et une somme de 1.000 francs suisses, sera décerné tous les deux ans à l'auteur vivant d'un travail original sur la pathologie, l'étiologie ou la prophylaxie du paludisme. La Commission du paludisme discutera les mérites relatifs des candidats qui lui seront proposés et son président transmettra l'opinion de la Commission au Comité d'hygiène qui, à son tour, communiquera à un Comité spécial chargé d'administrer la fondation, son avis sur l'attribution du prix. Après avoir pris connaissance du règlement qui lui était soumis, le Comité d'hygiène adopta la résolution suivante:

> Le Comité d'hygiène approuve le règlement concernant l'attribution d'un prix pour des recherches en malariologie destiné à perpétuer la mémoire du D[r] S. T. Darling.

X.

On several occasions in the course of the last two years, requests have been received by the President of the Health Committee or by the Medical Director that the Health Organisation should undertake an investigation from the international point of view of the problem presented by the treatment of rabies. In view of the importance of the proposals submitted to him, the Chairman of the Health Committee considered it necessary to sound the Pasteur Institute in Paris as to the advisability of convening an international conference on rabies. It therefore got into touch with Professor Calmette, Assistant Director of the Pasteur Institute, who declared himself entirely in favour of convening a conference of this kind, and expressed the opinion that the Health Committee was the only body competent to call such a meeting and to draw up an agenda. He also expressed the hope that, in deference to the wishes expressed by the Pasteur Institute, the international conference on rabies should be held at Paris in Pasteur's own house.

In view of these considerations, the Health Committee adopted the following resolution:

> The Health Committee decides to take steps to convene in 1927 at the Pasteur Institute in Paris an International Conference on Rabies to which the directors of the chief anti-rabic institutes of the world will be invited.

XI

The work of the Tuberculosis Commission was continued on two particular points. In the first place, the statistical investigation undertaken in France and Scandinavia into mortality from tuberculosis is being continued on the lines already decided upon. Secondly, on a proposal by Dr. Tsurumi, Chairman of the Tuberculosis Commission, Professor Calmette, Assistant Director of the Pasteur Institute at Paris, kindly consented to undertake an experimental investigation of the different methods employed in the titration of tuberculins in the hope of establishing a single and uniform international titration. In the remarkable paper on the question which he submitted to the Health Committee, Professor Calmette concludes that, despite the numerous methods of titration in use, it would probably be premature to propose the adoption of international rules to measure the activity of tuberculins and that further experimental researches should be made regarding their titration. Nevertheless, he proposes the adoption of a standard tuberculin as a unit of comparison and describes the methods which should preferably be used for titration.

Wishing to emphasise the importance it attaches to Professor Calmette's assistance in its work, the Health Committee adopted the following resolution:

> The Health Committee adopts the report of the Tuberculosis Commission and desires to express to Professor Calmette its appreciation of his report on the Titration of Tuberculin.

XII.

The Council will remember that, at its Thirty-sixth Session, it publicly paid tribute to the memory of the victims of the accident at Beirut on May 21st, 1925, in which Dr. Darling, Dr. Lothian and Mlle. Besson lost their lives during a journey undertaken by the Malaria Commission in Syria. At its Fifth Session, the Health Committee decided to form by private subscription a capital fund, the interest on which should be employed in awarding a periodical prize to be known as "The Darling Prize". The rules of the fund provide that this prize, consisting of a bronze medal and a sum of 1,000 Swiss francs, shall be awarded every two years to the living author of an original contribution on the pathology, etiology or prophylaxis of malaria. The Malaria Commission will discuss the relative merits of the candidates proposed to it, and its Chairman will communicate the Commission's opinion to the Health Committee which, in its turn, will inform a special Committee appointed to administer the fund of its opinion with regard to the award of the prize.

After noting the regulations submitted to it, the Health Committee adopted the following resolution:

> The Health Committee approves the regulations concerning the award of a prize for malaria research in memory of the late Dr. S. T. Darling.

XIII.

Un voyage d'études réservé aux fonctionnaires sanitaires des ports a eu lieu dans le Bassin de la Méditerranée, du 10 novembre au 23 décembre 1925. Les participants, qui appartenaient à huit pays différents, ont eu le privilège d'être guidés par le Dr Raynaud, membre du Comité d'hygiène. La visite de chaque port avait pour objet d'étudier les méthodes de dératisation et de désinfection des navires, l'outillage existant pour lutter contre les maladies infectieuses, les méthodes usitées en ce qui concerne les émigrants et la situation au point de vue des maladies infectieuses.

Dans un rapport détaillé présenté au Comité d'hygiène, le Dr Raynaud passe en revue les différentes observations faites au cours du voyage et qui ont trait, en particulier, aux lazarets, aux mesures de protection contre la peste, à l'examen bactériologique des rats suspects, aux méthodes de fumigation des navires, aux déplacements de populations, par le fait des pèlerinages et de l'émigration, et aux patentes de santé.

De son côté, la Commission consultative et technique des communications et du transit a établi un mémoire sur la répercussion des questions sanitaires sur la navigation maritime, en se fondant sur les modifications apportées à la Convention sanitaire internationale de Paris de 1912, telles qu'elles ont été adoptées par l'Office international d'hygiène publique, pour faire l'objet d'une discussion au sein de la nouvelle Conférence sanitaire qui s'est réunie le 10 mai 1926, à Paris. Ce mémoire envisage la patente de santé, les procédés de dératisation, la libre pratique, et formule certaines objections au texte établi par l'Office international d'hygiène publique. Tenant compte des documents qui lui étaient soumis, le Comité d'hygiène adopta la résolution suivante:

Le Comité d'hygiène,

Après avoir pris connaissance des communications du Dr L. Raynaud sur les constatations faites dans le voyage d'études collectif en Méditerranée des médecins sanitaires maritimes, ainsi que du mémorandum présenté par la Commission consultative et technique des communications et du transit de la Société des Nations, relatif aux questions sanitaires intéressant la navigation maritime (document C. C. T. 209),

Estime que les échanges de personnel sanitaire des ports devraient être renouvelés et qu'en particulier, toutes les fois que l'expérience aura établi que des méthodes de dératisation des navires donnent des garanties suffisantes, les directeurs des services de la Santé devraient être appelés à assister à des essais, en vue de leur permettre de former leur personnel à la pratique de ces méthodes.

XIII.

A study tour for port health officers was carried out in the Mediterranean from November 10th to December 23rd, 1925. The officers taking part, who belonged to eight different countries, had the privilege of being under the guidance of Dr. Raynaud, member of the Health Committee. Each port was visited with a view to investigating the methods applied in the deratisation and disinfection of ships, the equipment for fighting infectious diseases, the methods employed with regard to emigrants and the situation of infectious diseases.

In a detailed report submitted to the Health Committee, Dr. Raynaud reviewed the various observations made in the course of the journey, with special reference to quarantine stations, measures of protection against plague, the bacteriological examination of suspected rats, methods of fumigating ships, movements of the population resulting from pilgrimages and emigration, and bills of health.

The Advisory and Technical Committee for Communications and Transit drew up a memorandum on the effect of sanitary problems on maritime navigation. It based its report on the amendments to the Paris International Sanitary Convention of 1912 adopted by the Office international d'hygiène publique for discussion by the Sanitary Conference which met at Paris on May 10th, 1926. This memorandum deals with bills of health, methods of deratisation, and free pratique, and puts forward certain objections to the text drawn up by the Office international d'hygiène publique. After studying the documents submitted to it, the Health Committee adopted the following resolution:

The Health Committee,

Has studied Dr. L. Raynaud's communication on the observations made during the tour of Mediterranean ports made by port sanitary officers and the memorandum presented by the Advisory and Technical Committee for Communications and Transit of the League of Nations on sanitary problems concerning maritime navigation (document C.C.T. 209);

Considers that interchanges of port health officers should be repeated and that, wherever experience has shown that successful methods of deratisation of ships have been secured, directors of port sanitary administrations should be invited to attend tests of these methods so as to enable them to train their personnel in carrying them out.